THE

VETERINARY JOURNAL

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AUGUST, 1928.

Editorials

THE NATIONAL VETERINARY ASSOCIATION.

NEXT month will again see the annual gathering of the National Veterinary Association, and this time its members will be welcomed by the supporters of the Northern Division—the selection having fallen upon Newcastle-on-Tyne as the site for the Meeting.

The fact that the Armstrong College is there, and that those in authority there have added their welcome to that of the Mayor and Corporation of the City of Newcastle, makes one assured that nothing will be left undone from the social side to make the meeting a success.

From the point of view of the officials of the Association, it will be seen, upon reference to the comprehensive and varied programme which has been provided, that a successful endeavour has been made to suit all tastes ; and it now only remains for the members to attend in sufficiently large numbers to take part in the discussion, and to reward the efforts of those who have arranged the enormous amount of " spade " work which such an affair always of necessity involves. For full details and particulars we refer our readers to pages 427 to 430 of our present issue.

THE ROYAL VETERINARY COLLEGE.

Appointment of a Government Departmental Committee.

THE Royal Veterinary College has for some time, as our readers already know, been passing through troublous times—financially and in many other respects—and, at the request of the Governing Body, the Minister of Agriculture and Fisheries has appointed a Departmental Committee, under the chairmanship of Sir C. J. Martin, C.M.G., D.Sc., F.R.S., director of the Lister Institute, " to consider and report generally on the reconstruction of the Royal Veterinary College and the probable cost, and in particular on the questions what accommodation should be provided, having regard to the training to be given, whether that accommodation can and should be provided on the present site, if not, where the College should be transferred, and what arrangements should be made in respect of the Animal Pathology Research Institute now situated at the College, if it appears necessary to change the existing arrangements."

The Committee consists of Sir C. J. Martin, F.R.S. (Chairman), Dr. O. Charnock Bradley, M.D., D.Sc., M.R.C.V.S., Sir Merrik Burrell, Bart., Mr. H. E. Dale, C.B., Sir W. M. Fletcher, F.R.S., Mr. R. Jackson, M.R.C.V.S., Sir E. Cooper Perry, M.D., F.R.C.P., Major-General H. T. Sawyer, C.B., D.S.O., and Lieut.-Col. Sir Archibald Weigall, K.C.M.G.

Mr. V. E. Wilkins, of the Ministry of Agriculture and Fisheries, will act as Secretary to the Committee, and all communications relating thereto should be addressed to him.

It is interesting to know that England is not the only country whose Veterinary Colleges are receiving Government attention at the present time. France is rebuilding the Toulouse School, transferring it from its present cramped site to one of larger area and more favourably situated outside the city ; and Alfort has recently added a complete and up-to-date Canine Department costing several thousands of pounds.

Hanover is adding several acres more in the shape of an Obstetrical Department, the foundation stone being laid only last month, with appropriate ceremony, on the occasion of the 150th anniversary festival.

Belgium did the same some 25 years ago, the old College in Brussels being removed to a larger and more convenient site at Cureghem, in one of the suburbs ; and the University of Leipzig, whose Veterinary Faculty is the most elaborate in the world, has thought fit to allot no less than 22 acres to its buildings and surroundings.

Utrecht, too, is rebuilding, stage by stage, and the extent of the Veterinary Faculty of this University soon bids fair to rival Leipzig.

England is, as usual, last—but perhaps, on this occasion, this may be taken advantage of, and the result of the efforts of the good wishers of the London College may be to ultimately erect one which will have the advantages of all and avoid what are, in some of them, evident disadvantages, and even bad faults.

THE THIRD PROGRESS REPORT OF THE FOOT-AND-MOUTH DISEASE RESEARCH COMMITTEE.*

THE publication of the above report has come most opportunely, as the discussions which have recently appeared in the public press in respect to the length of life of the virus in the flesh, and especially the bone marrow, have excited more than ordinary interest and comment—comment, too, from the practical standpoint which, if, when followed up to a final conclusion the supplies from certain countries are definitely implicated, may have a very serious effect on our meat supply. Unfortunately, up to the present, although the amount of careful and tedious work which has been got through is enormous, the desired end is not yet in sight; but much knowledge has been gained and a stronger foundation laid for further progress.

To make abstracts from the Report would be to spoil its reading, for it is a brochure which every practitioner in a county district should possess—if only with the idea of being up to date in the latest literature on this terribly contagious disease.

It is especially appropriate that this review, although brief, should appear in this issue, as the latter (page 411) also contains a reference to a recently published text-book on the Ultra Filterable Viruses†, of which, as is well known, none are more contagious or dangerous than that of foot-and-mouth. The Report, the details of which are compressed into some 141 pages, with numerous micro-photographs, is a striking illustration of that dogged perseverance which is so characteristic of the work of the true scientist, whose goal can (as in this instance) only be attained after the invisible has been made visible by means which have yet to be discovered.

* To be obtained through any bookseller, or direct from H.M. Stationery Office, Adastral House, Kingsway, London, W.C.2. Pp. 141, illustrated. Price 5s. net.

† A modern summary of the Filterable Viruses, edited by Thomas M. Rivers, of the Rockefeller Institute. Published by Baillière, Tindall & Cox, London. Price 34s.

XUM

MAKING GOOD.

THE first three leading general articles show well the necessity for the encouragement of scientific veterinary study, and that it, too, like every other science, cannot stand still. The allusions to the recent celebrations of the Toulouse Veterinary College in France, and the Hanover Veterinary School in Germany, illustrate full well what can be done with the aid of Government encouragement and support, and the review of the work which has been carried out by the Department of Animal Pathology at Cambridge between the years 1923 and 1928 forms pleasant reading; as it illustrates that, given the proper financial backing and opportunity, the veterinary profession in Great Britain can produce just as good scientific work as is done by our confrères on the Continent. It is "opportunity" which is needed to bring our profession, as a profession, to the top. Its work in the eradication of disease is just as good as that of any other branch of science, but in the past we have been held back by lack of the necessary funds. If the public, the Government, or someone else will find the money, we of the veterinary profession can readily find the brains; and our necessity, wherever animals are to be found and their diseases are communicable to man, to the health and wealth of the nation is indisputable, even to those who are dull-witted.

General Articles

CENTENARY OF THE TOULOUSE NATIONAL VETERINARY SCHOOL.

THE Centenary of the Toulouse National Veterinary School was celebrated on Monday, July 9th, 1928, and Professor Leclainche, Head of the Veterinary Services at the Ministry of Agriculture, presided as the representative of the Minister of Agriculture.

A large number of veterinary surgeons, mostly old students of the School, attended the celebrations, as well as representatives of the Army and many scientific societies. Flags and other trophies were displayed in various parts of the building, and the War Memorial was decorated with the Croix de Guerre recently conferred on the French Veterinary Colleges.

At 10 o'clock the Old Students' Union met under the presidency of Dr. Faugère, supported by Dr. Daille, Secretary, and Dr. Pons, Treasurer. At 11 Professor Vallée gave an address on vaccination against foot-and-mouth disease, Professor Leclainche presiding.

After the lecture lunch was served to the members of the Union in the School refectory. Among the guests were Professor Leclainche, Professor Vallée, Director of the Research Laboratories at Alfort; Professor Nicolas, Principal of the Alfort School; Professor Bourdelle, of the National Museum of Natural History; Dr. Barrier, Honorary Inspector of the Veterinary Schools; and Dr. Breton, President of the National Association of Veterinary Surgeons.

At 3.15 the delegates and guests were officially welcomed in the main lecture-theatre by the Principal of the School, Dr. Besnoit. Professor Leclainche, who presided in the place of the Minister of Agriculture, was followed by Messrs. Fagedet, representing the Prefect of the Department; Billières, Mayor of Toulouse; Faugère, President of the Old Students' Union; General Maître, commanding the 17th Army Corps; Nicolas, Director of the Alfort National Veterinary School; Breton, President of the National Association of Veterinary Surgeons in France and the Colonies; Puis, Senator for the Tarn-et-Garonne Department, and at one time Under-Secretary of State for Agriculture; Duchein, Senator for the Haute-Garonne Department; Ramet, First Justice at the Court of Appeal; Dresch, Rector; and Abelous, Dean of the Faculty of Medicine; Sabatier, Dean of the Faculty of Science, Member of the *Institut;* Dürrbach, Dean of the Faculty of Arts, Member of the *Institut;* Magnol, representing the Dean of the Faculty of Laws; Labat, late Principal of the Veteri-

XUM

nary School; Lafforgue, Director of the Medical Services of the 17th Army Corps, Professor of the Faculty of Medicine; Vallée, Honorary Director of the Veterinary Schools, Director of the Research Laboratory of the Ministry of Agriculture at Alfort, etc., etc.

The Band of the 17th Army Corps then played the Marseillaise. When everyone was again seated the Principal, Dr. Besnoit, stated that the Toulouse Veterinary School was the most recent of the three French Veterinary Schools, and that its foundation by Royal Decree of July 6th, 1825, filled a very real want in that part of France. He stated how Bourgelat, a discontented barrister, founded a Riding Academy in Lyons, which, with the help of Bertin, the Minister of Finance, was transformed into a veterinary school on August 5th, 1761. Thus the first veterinary school of the world was established, and shortly after (on October 1st, 1766), Bourgelat founded another at Alfort. The foundation of these schools, their distance from the South of France, and their teaching (which was restricted almost entirely to the study of the horse) led the local authorities in this region to agitate for the foundation of a third school. In 1761 the Town Council of Toulouse proposed to raise 600 pounds to defray the cost of a school, and twice petitioned the King, but it was not until 1793 that a decree of the Departmental Prefect was promulgated for the establishing of a Departmental School in Toulouse. Even then, through lack of encouragement, the scheme came to nothing. In 1804, owing to the continued petitions of the authorities of the district, the State sent a delegate to inquire into the respective claims of Toulouse and Cahors, which at that time were in dispute as to which should have the privilege of a veterinary school, and it was decided that the greater importance of Toulouse as regarded agriculture outweighed the claims of Cahors. In the meantime the Agricultural Society of the Haute-Garonne Department, under authority, had set up a course in anatomy, physiology, and diseases of animals, with practical work, and they now proposed to merge it into this school. As a result of this an Imperial decree was signed by Napoleon in 1808 establishing a veterinary school, at the expense of the Department, in the Botanical Gardens. Before this could be carried out, however, political reasons led to a further decree (1813) suppressing the Toulouse school in favour of three new schools at Zutphen, Aix-la-Chapelle, and Turin. Repeated petitions in the next three years led only to the reply that lack of funds prevented any allowance being made "for the moment." Not until 1823 was any further official mention made of a veterinary school at Toulouse; in that year the Châlons School of Arts and Crafts was transferred to Toulouse as compensation for the absence of a veterinary

school, but such a storm of protest was raised that it was decided to return the Arts and Crafts to Chalons and give Toulouse a veterinary school (Royal Decree of July 6th, 1825). The town and department were obliged to support the cost of ground and building, and spent some 800,000 francs in doing so; when the school was finished the State took it over, and since then it has always been directly under the authority of the Minister of Agriculture.

Having thus given a history of the difficulties that had to be overcome before the School was founded, of which the above is a short summary, Dr. Besnoit referred to the great scientists who had been at various times members of the teaching staff of the School—in Botany, Rodet; in Parasitology, Raillet and Neumann; in Anatomy, Lavocat, Barrier, Montané, Bourdelle; in Physiology, Colin, Arloing, Lalaunié; in Zootechny, Sanson; in Clinical work, Bernard and Lafosse; and in Microbiology, Toussaint, Leclainche and Vallée. Dr. Besnoit then referred to the pressing need for expansion.

As far back as 1899 he said, the days of the old buildings were numbered. In that year the administrative buildings of the town were partly destroyed by fire, and the authorities drew up a report pointing out the advantages to themselves, to the Veterinary School, and to the Midi Railway, of moving the School out to the country. But no final arrangement was arrived at until 1909, and later, when some 18 acres of ground on the neighbouring plateau of Joliment were offered as substitute for the old site. Plans were drawn up in 1914, 1915 and 1916, by the Departmental Architect in conjunction with the Principal, Professors, and Inspector, of the School. These were definitely approved by the Office of Works, the Under-Secretary for Arts, and the Ministry of Agriculture in May, 1917. The plans were of a model school, made up of separate buildings for each of the subjects taught, and set up with the maximum of comfort, and with the latest scientific improvements. Unfortunately war conditions prevented the carrying out of these schemes, in spite of the fact that for thirty years the necessity of moving had become more and more acute, partly through the continued encroachment of the Midi Railway on neighbouring ground, and even on that of the School, but also because of the dilapidated state of the buildings. Thanks largely to the generosity and perseverance of the Municipal Authorities of Toulouse, however, the rebuilding cannot now be far off, on a ground, moreover, which is nearly twice as large as that previously offered.

Dr. Besnoit then took the opportunity of thanking the Toulouse Council for its continued support, and, in conclusion, once more thanked all those who had helped to make the Centenary Celebrations a success.

XUM

THE 150th ANNIVERSARY OF THE HANOVER VETERINARY HIGH SCHOOL.*

On July 18th, 1778, "George the Third, by the Grace of God King of Great Britain, France and Ireland, Defender of the Faith, Duke of Brunswick, etc. etc.," by Royal Mandate, ordained that a Veterinary School should be created in the town of Hanover. The present year, therefore, is the 150th since the foundation of the school, and the occasion was celebrated by an impressive ceremony that took place on Thursday, June 14th. This *akademischer Festakt* was so largely attended that the Hall of the Veterinary High School was far too small to accommodate more than a fraction of those who had intimated their intention to be present, and the ceremony consequently was held in the Stadthalle. No really adequate conception of the function can be conveyed by words alone, but an imperfect idea of its magnitude and splendour may possibly be formed when it is said that the largest hall in the town of Hanover was almost filled to its full capacity, and that most of those who occupied the platform wore robes of office of considerable magnificence.

Addresses of greeting and congratulations were delivered by 25 representatives of European and American institutions. Colonel Brittlebank, in the capacity of President of the Royal College of Veterinary Surgeons, and, consequently, as representing the veterinary profession of this couutry, said how keenly alive Britain was to the important part the Hanoverian School had played and continued to play in the development of veterinary science. He asked those who were connected with the School to regard his presence as indicative of sincere good wishes for the future no less than congratulation for achievement in the past.

In addition to the selected speakers who delivered addresses at the chief ceremony, many others had offered greetings to His Magnificence the Rector (Professor Miessner) on the previous day.

The principal ceremony was followed by a banquet that was attended by over 1,200 persons, at which representatives of other countries were entertained as guests.

On the morning of Friday, June 15th, a ceremony of short duration but of great interest took place at Langenhagen, a short distance outside Hanover, where a memorial tablet to Robert Koch was unveiled. The tablet is affixed to the house where Koch lived while doing some of his earlier bacteriological work.

* For this description our readers are indebted to Principal Charnock Bradley, who, with Lieut.-Colonel Brittlebank and Mr. G. H. Locke, were the British representatives who attended the ceremony. Principal Hobday and Professor Share-Jones, who were also invited and had accepted the invitation, were unavoidably prevented at the last moment from attending.

In the afternoon of the same day the foundation stone of the new buildings of the Veterinary School was laid. When the proposed extensions are completed the school will be about twice its present size.

All the formal ceremonies were carried through with an impressiveness that will not soon be forgotten by those who were privileged to be present, and the social functions—a garden party, the banquet, and an evening at the opera—were marked by a cordiality that was much appreciated by the guests.

A REVIEW OF THE WORK CARRIED OUT BY THE DEPARTMENT OF ANIMAL PATHOLOGY, CAMBRIDGE, 1923-28.*

THE department actually came into being towards the end of 1923.

In their report for the year 1922–23 the Development Commissioners aimed at framing a " directory " to the Research Stations, which included the following statement in connection with this proposed department:

" The existence of strong medical and agricultural schools in the University, and the agricultural importance of the tract of country, of which the town forms the geographical centre, pointed to Cambridge when the future home for an Institute for Research into the Diseases of Animals was being considered. A scheme was brought forward by the Ministry of Agriculture and Fisheries, and, after discussion, was agreed to by the Commissioners, which had as its first object the establishment of a Professorship of Animal Pathology within the University. It was recognised that the best method of securing a competent Professor would be to provide the University with an endowment for the purposes of the new Chair, and it was further agreed that the detailed development of the scheme must await the election of the first Professor. The University was accordingly approached, and, after the financial commitments had been fully examined, the Council intimated their acceptance of the endowment. The Commissioners were therefore, able to recommend a grant of £30,000 from the new Fund to the Ministry of Agriculture and Fisheries to be paid over to the University of Cambridge on the following conditions :—

" 1. That the University founds a Chair of Animal Pathology, and proceeds thereafter to elect a Professor, whose tenure of office shall, in the first instance, be for five years.

* The Complete Review can be obtained upon request from the Director, Institute of Animal Pathology, Cambridge.

XUM

"2. That out of the income of the endowment there shall be paid to the Professor of Animal Pathology such salary as the University may determine, and that the balance of the income (if any) shall be applied to expenses in connection with the Chair.

"3. That the Professor, when elected, shall prepare a scheme for the development, within the University, of the study of the diseases of farm animals. For the purposes of an approved scheme the Commissioners will be prepared to recommend grants from the fund provided by the Corn Production Acts (Repeal) Act, 1921.

"4. That the University be informed that the Commissioners are not in a position to recommend any assistance towards expenditure on the study of animal diseases at Cambridge from funds other than the Corn Production Acts (Repeal) Act Fund, and that when this Fund is exhausted their commitments will terminate.

"Steps were taken immediately by the University to secure a Professor. Mr. J. B. Buxton, F.R.C.V.S., has now been elected."

The Professor was appointed in August, 1923, and the necessary preparations for obtaining and equipping temporary accommodation were commenced in September of that year.

In order that there should be no delay in providing the essential facilities for a continuation of any work in which members of the staff might be engaged at the time of their appointment a provisional scheme was submitted by Professor Buxton to the Development Commissioners, and was approved by them, which would enable work to be carried out by the department until the end of the current financial year (March 31st, 1924), by which time the general scheme would be prepared. The amount of the grant sanctioned for this period was £4,270.

Although no special buildings were available temporary accommodation was provided in the Medical Schools and at the Field Laboratories.

Owing to the generous co-operation by existing Departments in the University in this and many other directions the Director was able to collect a staff and to begin a number of investigations without delay.

Early in 1924 the following scheme for buildings, equipment, staff and maintenance was prepared and submitted to the Development Commissioners by Professor Buxton.

In accordance with the conditions of my appointment to the Chair of Animal Pathology, I beg to present a scheme for the provision of adequate permanent accommodation and temporary maintenance

(*i.e.* until March 31st, 1927, when the special grant from the Development Commission will cease to operate) of the Institute of Animal Pathology at Cambridge.

It is very necessary that a field station should be provided and that the accommodation and general facilities at this station should be sufficient to meet all reasonable requirements.

I therefore recommend that the sum of £19,000 shall be given for the provision at the present Field Laboratories, Milton Road, of an infectious unit consisting of laboratories, accommodation for large and small animals, and also for acquiring additional land for the erection of a non-infectious unit consisting of similar accommodation.

It is essential to the future development of comparative pathology in Cambridge that the study of the diseases of the lower animals should be linked as closely as possible with the study of human diseases, and possibly at some future date with plant pathology. The term pathology is here employed in its broadest sense, and includes bacteriology, parasitology and immunology.

With a view to establishing a permanent link between the first two departments it is proposed that the Institute of Animal Pathology shall adjoin the new School of Pathology to be erected upon the Downing Street site, and that a sum of £15,000 shall be set aside for the provision of the necessary accommodation and equipment.

Such an arrangement has an additional advantage in effecting a considerable saving, since the cost of erection will be less than that of a separate building, and the necessity of providing a library, museum, media and histological departments will be avoided, since they can be common to the two Institutes.

The scheme, with some minor modifications, was accepted by the Treasury and the Development Commissioners. A capital sum of £34,000 was sanctioned for buildings, land and equipment, together with an annual grant of £10,000 for maintenance.

Sanction was also obtained for the following graded staff of research workers :—

1 Principal Assistant at a salary of £700, rising to £800 and bonus.
1 Principal Assistant at a salary of £600, rising to £800 and bonus.
1 Senior Assistant at a salary of £500, rising to £600 and bonus.
3 Junior Assistants at a salary of £300, rising to £360 and bonus.
1 Principal Laboratory Assistant.
1 Senior ,, ,,
2 Junior ,, Assistants.
2 Boy ,, ,,
2 Animal Attendants.

XUM

Capital Expenditure,
Field Laboratories, Milton Road.

		£	s.	d.
Laboratory buildings, including 4 laboratories, hot, cold, sterile, operating and sterilising rooms, 15 infectious boxes, 2 cottages, 15 loose boxes, 27 acres additional land with all necessary services and equipment		19,000	0	0
ACCOMMODATION, DOWNING STREET SITE.				
Laboratories, offices, demonstration rooms, services and equipment		15,000	0	0
STAFF, SENIOR.				
1 Principal Assistant, £700—£800 and bonus, etc.	Three years ending March 31st, 1927.	2,460	0	0
1 Senior (Protozoologist), £600—£800 and bonus, etc. ...		1,980	0	0
1 Assistant, £500—£600 and bonus, etc.		1,860	0	0
1 Assistant, £400—£600 and bonus, etc.		1,560	0	0
3 Junior Assistants, £300—£360 and bonus, etc.		3,200	0	0
STAFF, JUNIOR.				
1 Principal Laboratory Attendant at £4 16s.—£249 12s. per annum.				
1 Senior Laboratory Attendant at £4—£208 per annum.				
2 Junior Laboratory Attendants at £2—£208 per annum.				
2 Boys at £1—£104 per annum.				
2 Animal Men at £2 to £2 10s.—£247 per annum.				
For three years		3,049	16	0
Maintenance, £7,000 per annum, including average annual expenditure on animals, materials, travelling expenses, compensation for owners of animals, temporary assistants, clerical staff and upkeep generally		21,000	0	0
		£69,109	16	0

The staff was gradually got together during 1924, and, by the end of the year the activities of the Institute were fully developed.

In the summer of 1926 the Field Laboratories of the Institute were completed. These consist of a main laboratory building, a unit for infectious animals, a non-infectious unit, and two houses.

The accommodation in the new School of Pathology consists of six laboratories and two offices, and includes the use of the various services and of lecture rooms, museum, library, etc.

The sum of money from the Corn Production Act (Repeal Act) allocated for the maintenance of the department of Animal Pathology,

was exhausted by March 31st, 1927. Thereafter the maintenance of the Institute was assured by a block grant from the Treasury which, in effect, places the Institute in an exactly similar position to that of other departments of the University, and of other Institutes which are financed from the same source, and provides an annual grant for maintenance of £10,000. This sum has been received up to the present time. The Institute is the largest and best equipped of its kind in the country.

Present Organisation.

	STAFF.
Director	Professor J. B. Buxton, M.A., F.R.C.V.S., D.V.H., Professor of Animal Pathology in the University of Cambridge.
Assistant Director and Pathologist.	T. J. Bosworth, B.Sc., M.R.C.V.S., D.V.S.M.
Protozoologist	Vacant.
Pathologists	R. E. Glover, B.Sc., M.R.C.V.S. W. A. Wood, C.B.E., M.A., M.R.C.V.S. W. J. Leyshon, M.R.C.V.S. J. R. M. Innes, M.R.C.V.S. Vacant.
Biochemists	J. Stewart, M.A., B.Sc. G. Shearer, B.Sc.
Biological Laboratory	H. R. Allen, M.R.C.V.S.
Research Student	A. C. Fraser, B.V.Sc., M.R.C.V.S.

Aims of the Institute.

The work of the Institute consists primarily of investigations into diseases of farm animals.

In order that effect may be given as economically as possible to this procedure liaison is maintained with veterinary practitioners, agricultural organisers and stockowners.

In addition a Department has been created which deals entirely with the routine diagnosis of pathological material sent in by veterinarians and stockowners, while the Agricultural Organisers keep the Institute informed of serious outbreaks of disease amongst animals in their areas. This organisation has proved to be of great value in preventing and controlling losses upon individual farms.

An important feature of the work of the Institute is its mobile section. In order that investigations may be carried out upon premises at which an outbreak of disease has occurred a motor laboratory has been specially built and equipped in such a way that, while being capable of considerable speed and mobility in difficult places, it provides all the necessary facilities for prolonged field investigations.

INFECTIOUS BOXES.

By this means such investigations can be carried out in an efficient manner in any part of the country.

The following is a brief review of the main lines of inquiry which have been pursued by the Department of Animal Pathology since its inception in 1923 and of such other observations as bear upon its work in general.

TUBERCULIN TESTS.

The investigation into the reliability of the tests usually employed for the detection of tuberculosis in cattle, especially the subcutaneous test, and the possibility of devising a method which should be at least as effective as those already in use and less subject to non-specific influences, had been begun in 1922 by the tuberculin Committee of the Medical Research Council, of which Professor Buxton was a member. After the Institute had been started, that portion of the investigation in which Professor Buxton was particularly interested, namely, the carrying out of many experiments in order to determine the efficiency of the proposed new double intradermal test, was continued by the staff of the Institute. In 1924 a large scale experiment was undertaken at the Metropolitan Cattle Market, London. Over 100 cattle of all ages, destined for slaughter, were tested by the new method. A very thorough *post-mortem* investigation, including microscopical examination and inoculation experiments, was carried out in the case of reactors as well as non-reactors to the test. The result obtained fully justified the expectations already formed as to the detective value of the double intradermal test, for it was found that it had indicated correctly the presence or absence of tuberculosis in 98 per cent. of cases. A number of stringest tests followed, and when possible, *post-mortem* examinations were made; the results obtained have entirely confirmed the earlier favourable opinion of the test and its superiority over the subcutaneous test when made under field conditions.

THE POTENCY OF TUBERCULIN.

In 1923, as a result of experiments carried out on behalf of the Tuberculin Committee of the Medical Research Council, several investigators found that the potency of tuberculin used for the detection of tuberculosis in animals varied very considerably. Until then it had been impossible to use tuberculous cattle for the comparison of a new batch of tuberculin with one of proved potency, since only one subcutaneous injection of tuberculin could be given at a time in one animal; and although the tuberculin of unknown potency might have been injected into an animal which was known to be tuberculous, since the response of individuals to the application of tuberculin varies so greatly no useful comparison could be made with a tuberculin

XUM

of known value. Having established the efficacy of a double injection of tuberculin in determining the reaction of the tissues of a tuberculous animal, a method was devised whereby one or several tuberculins of unknown value could be compared for potency with two tuberculins of known strength (" standards ") in the same animal. It is now possible by this means to ensure that tuberculin of adequate potency is employed for testing purposes, and the Institute has defined a " standard " for such tuberculin.

TUBERCULOSIS OF SWINE.

In collaboration with Dr. A. Stanley Griffith, of the Scientific Staff of the Medical Research Council, a member of the Institute's staff, Mr. R. L. Cornell, carried out an investigation into the types of tubercle bacilli which may be responsible for tuberculosis in swine. Material from tuberculous pigs was obtained from Smithfield Market, where pigs are received from all parts of the country for slaughter. It was found that in this country, as had been observed in the United States of America, an appreciable portion of cases of tuberculosis were due to the avian type of the bacillus, although the greater number were caused by the bovine type. This observation was of considerable importance, since it is a common practice to run pigs over ground which has carried poultry, and in view of the frequent occurrence of tuberculosis in domestic fowls the danger of infection of the pigs should be appreciated.

PROTECTIVE VACCINATION.

Following upon the work of Calmette and Guérin, in which attempts have been made to protect children and animals against tuberculosis, experiments are being carried out by Professor Buxton in collaboration with Dr. A. Stanley Griffith with a view to determining if calves can be immunised by means of the B.C.G. vaccine (Calmette and Guérin) so as to withstand a suitable test dose of virulent bovine tubercle bacilli. So far as the experiments have gone there is evidence to show that some degree of immunity is developed as a result of the introduction into the animal body of B.C.G. vaccine.

FILTRABILITY OF THE TUBERCLE BACILLUS.

Various observers have described experiments by which it had been shown that certain preparations of the tubercle bacillus were capable of passage through fine porcelain filters. If such is, indeed, the fact, the importance of the observation is obvious. Mr. R. E. Glover, of the Institute, who has made a special study of certain " filter passing " or " ultra visible " viruses, is at present carrying out an investigation in collaboration with Dr. Stanley Griffith along these lines.

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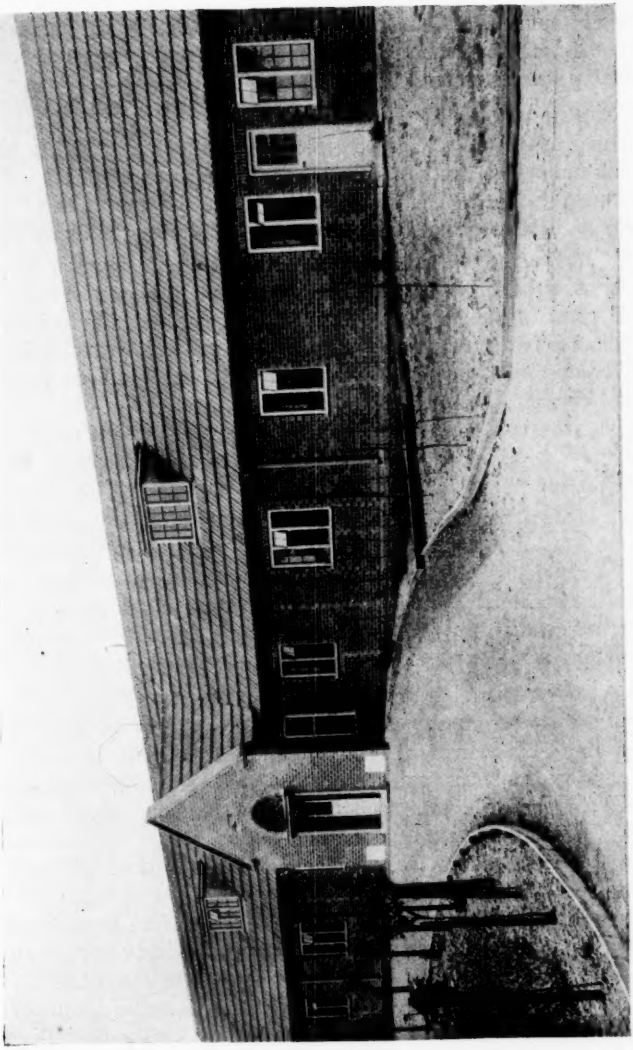


FIELD STATION. INSTITUTE OF ANIMAL PATHOLOGY.

SHEEP DISEASES.

Owing to the enormous annual loss suffered by flockowners as a result of a number of diseases which cause a high mortality amongst their sheep an endeavour has been made to elucidate some of these hitherto neglected diseases.

IMMUNISATION AGAINST BRAXY.

Braxy, a disease of sheep, especially in the North of England and in Scotland—is caused by the *vibrion septique*, an organism which was found to be frequently associated with the causation of gas gangrene of the troops in France and Flanders during the Great War.

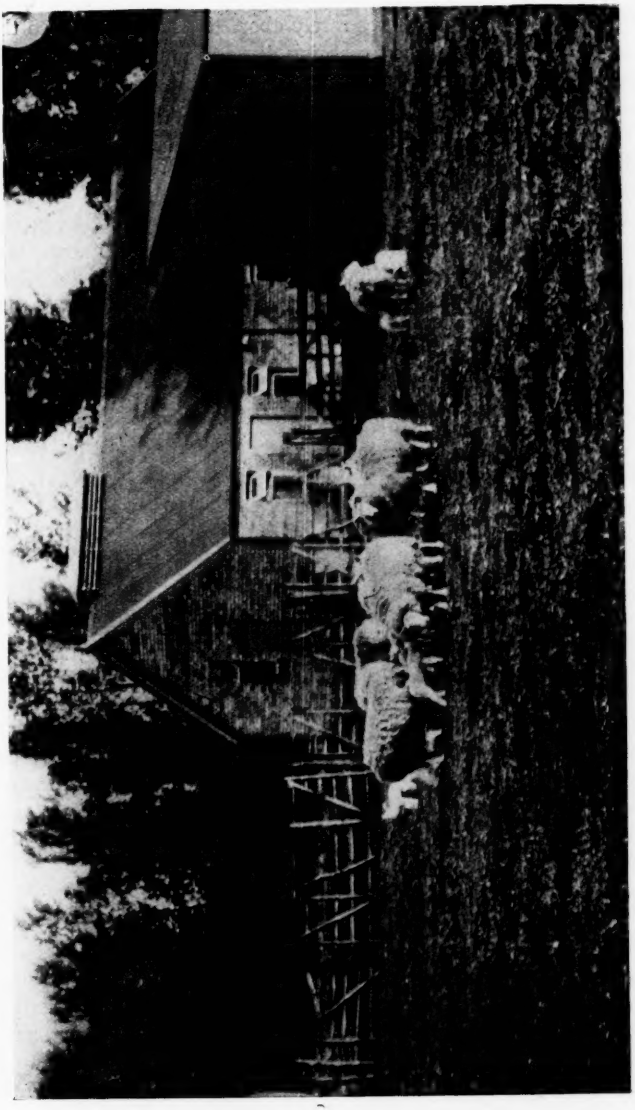
Mr. Bosworth, who has specialised in the study of diseases due to organisms of this type (pathogenic anærobes), had, previous to his appointment at the Institute, initiated and controlled experiments which had for their ultimate object the active immunisation of animals against infection with the *vibrion septique* and a closely allied organism *bacillus chauvœi*.

This work was continued during 1924 and 1925, and it was found to be possible to produce a very high degree of resistance in sheep to the disease.

A modified method of vaccination was tried last year. Eight thousand animals in Northumberland were treated with apparently satisfactory results. This method has the advantage over all previous methods in that only one injection of the material is necessary—an apparently trivial but really very important, point in the practical application of treatment to large numbers of semi-wild animals.

CONTAGIOUS ABORTION OF EWES.

Twenty-five years ago a Commission was appointed to enquire into epizootic abortion of cattle and sheep. As a result of their labours the nature of the disease and the causal agent in sheep were described. During the earlier investigations into sheep diseases carried out by the staff of the Institute, it was found that in certain of the Eastern Counties the annual loss occasioned by premature birth of lambs was a very serious matter. The disease presented features which in several respects differed very definitely from those described by the Commission, and it was therefore decided that it should be investigated. The work was undertaken by Messrs. Bosworth and Glover. At an early stage in the inquiry it was ascertained that the causal agent described by M'Fadyean and Stockman, working for the Commission, was not present, and later an organism of the paratyphoid group was found to be responsible for this variety of disease. It was shown later that susceptible animals could be protected successfully against infection, both experimentally and under natural conditions. A



A Corner of one of the Fields.

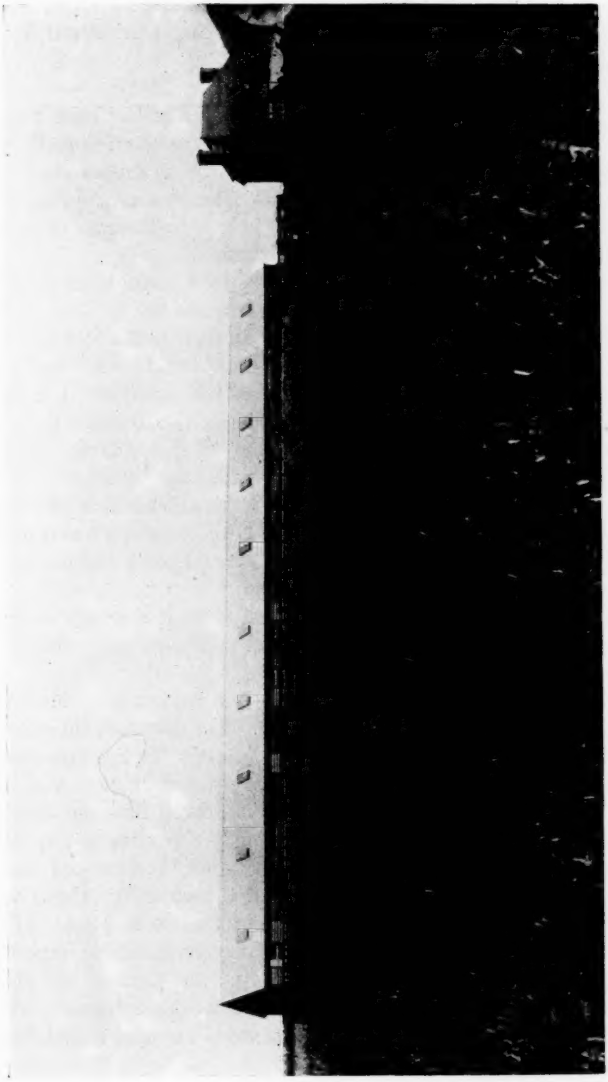
subsequent observation, which was of far greater practical importance, was the fact that infected ewes rarely aborted a second time, so that in infected areas instead of discarding diseased animals it was found to be advisable to retain them in the flock and to immunise any fresh susceptible ewes that might be brought in.

Further, a blood test was devised by which it was found to be possible to differentiate between diseased and susceptible animals. The study of this disease was also of considerable interest from the point of view of comparative pathology, for, as is well known, outbreaks of paratyphoid infection in man occur fairly frequently and are usually regarded as being due to infection from a human " carrier." It is possible, however, that in some instances infection may actually originate from an outbreak of disease in the lower animals, such as that which has been described.

Still more recently another form of contagious abortion of ewes has been investigated by Professor Buxton and Mr. A. G. Thompson. While the causal agent very closely resembles that described by M'Fadyean and Stockman morphologically, it shows marked differences in its cultural requirements. Clinically also the disease differs in many important respects. As in the case of the paratyphoid " B " infection, animals appear to acquire a considerable degree of immunity and rarely abort a second time. A further important observation is that the male is able to transmit the disease, and that the causal organism is present in his blood and liver. This discovery makes it reasonable to assume that in the case of other bacterial diseases in which the male has been suspected of transmitting the infection, but since such transmission was thought to be of a purely mechanical nature or associated with disease of the reproductive organs, the hypothesis has been discarded, he may, indeed, be an important factor in the spread of the disease. If this should prove to be the case, and evidence in support of the idea is accumulating, many hitherto obscure factors will be explained.

MASTITIS IN EWES.

During the past three years an endeavour has been made to determine the causal factor or factors associated with mastitis of ewes. Owing to the difficulty in collecting specimens, and the relatively short seasonal period during which these cases occur, the investigation is likely to extend over several years. Continental workers have described a contagious agalaxia of sheep and goats due to an ultra-visible virus. So far it has not been possible to confirm these findings in the material which has been obtained in this country. In one instance only has there been reason to suspect that such a virus was present, but, in view of the very great variety of organisms which



NON-INFECTIOUS UNIT.

have been isolated from different cases of the disease, the possibility of a common primary cause such as an ultra-visible virus, has not been overlooked. This investigation is being carried out by Mr. W. J. Leyshon.

JOINT-ILL OR POLYARTHRITIS OF LAMBS.

During the past three years an investigation has been made of this serious condition in lambs by Messrs. Glover and Cornell. It is highly probable that several distinct types of organisms are capable of setting up the disease once they have become established in the animal's body. It is known that this is true in the case of foals, in which the disease has received more attention.

Four outbreaks of the disease in lambs have been definitely shown to be due to a streptococcus, and in one the bacillus of swine erysipelas was found to be responsible. In three of the four outbreaks in which the streptococcus was found there could be no doubt that infection occurred after birth by way of the umbilicus, but in the fourth outbreak some of the lambs were visibly ill when born, and showed swellings of the joints within a few hours of birth. In most cases they died within 48 hours. There was no evidence of umbilical infection. Further, a streptococcus which was identical in all respects with that isolated from the joints of the affected lambs, was recovered from the uterus of one of the ewes whose lamb had died of the disease. The uterus itself was found to be diseased.

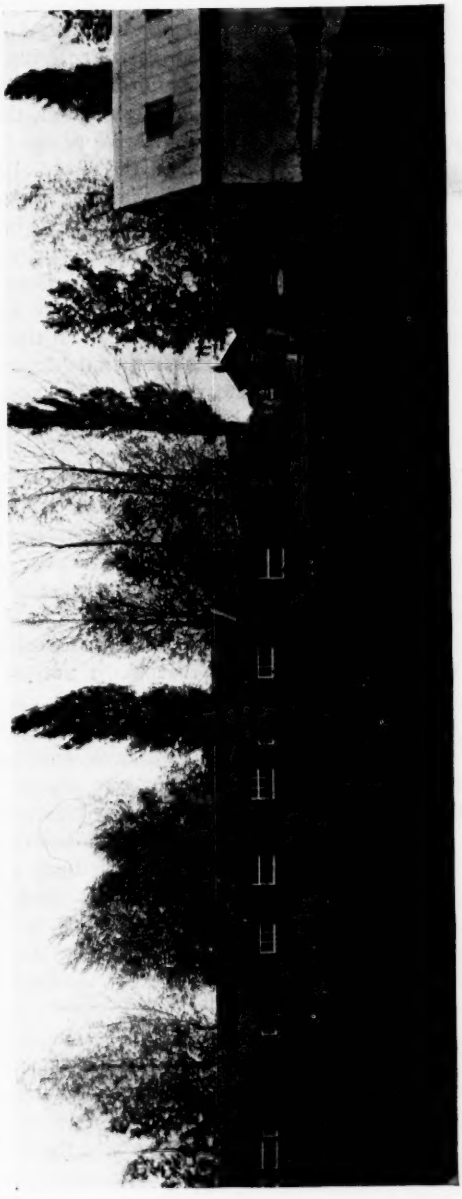
This outbreak was of special interest since it strongly suggested that infection may in some cases at least take place before birth.

PUSTULAR STOMATITIS.

An inquiry into the etiology of this disease of lambs by Mr. Glover has yielded extremely interesting results. The disease is characterised by the formation of wart-like excrescences on the lips and noses of lambs, and possibly upon the mammary gland of ewes which are suckling infected lambs. Mr. Glover has proved that the disease is caused by an ultra-visible virus, and that the virus is capable of producing these papillomatous-like growths when inoculated into the skin of susceptible animals. In view of the virus hypothesis which has been associated with the causation of various neoplasms of man and the lower animals, this work is of very considerable importance in the study of comparative pathology. Mr. Glover has shown, further, that susceptible animals can be rendered immune to the disease by means of inoculation of desiccated material containing the virus.

PARASITIC GASTRO ENTERITIS.

The parasitic infestations of the lower animals are probably responsible for a heavier annual loss to stockowners than any other



STABLES.

disease. This is particularly true of the stomach and intestinal worms of sheep which produce a severe gastro enteritis which, if it does not always cause the death of the animal, renders it practically valueless. Many remedies have been suggested from time to time, and during the past three years Colonel W. A. Wood has devoted himself almost entirely to an investigation of the remedial value of an enormous number of drugs. Many heavily infested sheep of all ages have been kept at the Institute and treated with courses of the various well-known remedies, as well as with a number of new substances. The effect of the particular agent under trial is determined by ascertaining the number of ova of the different nematode worms which are voided in a given period of time in the fæces of the host. This work has been most laborious, and has necessitated many thousands of counts. So far, no really satisfactory treatment has been discovered, and many popular remedies have been proved to be valueless.

SHEEP-DIPPING TRIALS.

At the request of the Ministry of Agriculture experiments have been undertaken with a view to determining the efficacy of some proprietary sheep dips in the treatment of " scab " or mange of sheep.

PROTOZOOLOGICAL.

When Dr. Jameson was appointed as protozoologist to the Department in 1924 it was decided to commence the work by making a survey of the protozoa normally present in the intestinal canal of domestic herbivora. It was thought possible that under normal conditions balance might be maintained between the protozoa and intestinal bacteria of certain kinds, while, as a result of some pathological conditions this balance might be upset and have some bearing upon the changes observed. This alteration in balance was, in fact, established, but owing to the fact that it was found to be possible to " cultivate " some of the protozoa, notably *balantidium coli*, in vitro, and the far-reaching effects that this might have upon experimental chemo-therapeutic observations, it was decided to pursue this investigation. The results have fully justified the change in programme. This work was unfortunately brought to an abrupt termination in August, 1927, by Dr. Jamesons's appointment to the Chair of Zoology at Mills College, California.

DISEASES OF SWINE.

A number of diseases of pigs have been investigated. The most important, owing to the extent of its ravages in the Eastern Counties, is swine erysipelas.

In 1923 there was no known means of checking the disease except by the use of an immune serum. The serum was not prepared in this country, was difficult to obtain, and varied very considerably in value.

The earliest work undertaken by the Institute was an attempt to prepare an immune serum of high potency, and in such a manner that the life of the horse from which the serum was prepared was not endangered by the use of living organisms. It was found that a potent serum could be produced in a few months from horses by the injection at certain intervals of cultures of the swine eysipelas bacillus which had been rendered harmless to the horse by chemical means. The use of this serum was most successful in checking the spread of the disease in herds of pigs.

During the year 1923-24 eighteen litres of the serum were prepared and distributed for experimental purposes. During the following year 7,300 doses were distributed. As a result of the demand created by the successful use of this serum it can now be obtained from commercial firms in this country.

Since the use of serum is limited to the treatment of animals in which the disease has occurred, or to those which are in contact with them, an attempt has been made to devise a means of inducing an active immunity by means of a vaccine, and so prevent the disease making its appearance in a herd. Hitherto, protective inoculation practised on the Continent has consisted of the simultaneous injection of culture of the living organism and immune serum.

This method is very unsatisfactory. It not infrequently happens that pigs develop the disease as a result of the inoculation, or that the immunity which is produced in them is insufficient to afford a solid protection against subsequent infection, even when this takes place a few weeks later.

Experiments have therefore been carried out in which the culture of swine erysipelas bacilli has been chemically treated in such a way that while it is incapable of producing the disease its antigenic properties are not interfered with. Laboratory experiments with this material have proved entirely satisfactory, and it is now being tried under field conditions.

The preparation of the anti-swine erysipelas serum and experimental work with the vaccines have been undertaken by Mr. H. R. Allen.

NUTRITIONAL DISEASES.

During the past year an attempt has been made to augment the facilities for team work in research by the development of a biochemical laboratory within the department.

Messrs. Stewart and Shearer are at present engaged, with other members of the staff, in a number of important investigations, including a study of the metabolic, pathological and nutritional effects of rations containing an excess of protein in the sheep.

XUM

An investigation is also being carried out into the mechanism of cellulose digestion in ruminants, in the course of which it has been found that a cellulose splitting organism, isolated from manure, is capable of producing glucose as an intermediate product in the breaking down of cellulose. There is reason to believe that most of the cellulose is ultimately absorbed into the animal body in this form, thus supporting Kellner's view that " for fattening purposes digestible fibre and digestible carbohydrate possess equal values." This work has been carried out by Mr. Stewart in collaboration with Dr. Woodman, of the School of Agriculture.

A series of experiments are in progress with a view to determining the normal amount of calcium, phosphorus, potassium, sodium and chlorine in the bones of young pigs. Very little appears to be known concerning the presence of these substances, and it is thought possible that the information which is being obtained may throw some light on the cause of death in very young pigs.

ROUTINE DIAGNOSIS.

As mentioned earlier in the report an important feature of the activities of the Institute was the creation of a small department which deals exclusively with the diagnosis of pathological material sent in by stockowners and veterinarians.

This work is carried out by Mr. W. J. Leyshon with the help, when necessary, of other members of the staff.

That the work is appreciated by owners of animals is shown by the fact that the number of specimens sent for diagnosis increased from 326 during the first year to 892 during the second, and to 1,364 during the third year. The department is also of value in bringing to the notice of the staff outbreaks of disease which would otherwise escape attention.

THE VETERINARY SERVICE IN POLAND (1928).

By COLONEL VET. DR. KONRAD MILLAK,

Editor of " Wiadomosci Weterynaryjne," Warsaw.

THE reference to the statistics from 1924 shows that there were 1,100 veterinarians in Poland. Of this number in the Government Service there were 407 ; in the Army Veterinary Service, 194 ; in the Municipal Veterinary Service, 226 ; in the Veterinary Schools, as professors, lecturers, etc., 42 ; private veterinary practitioners, 205 ; and those retired from the profession, 21.

There are two veterinary schools in the Republic : the Veterinary Academy in Lwow and the Veterinary Faculty of the University of

Warsaw, both possessing all the rights of the Faculty. The course lasts four and a half years (nine terms). The students are prepared for the degree of the veterinarian (*medicus medicinæ veterinariæ*), which is the legal licence to practise veterinary medicine and surgery in this country. The veterinarians who want to obtain the degree of Doctor of Veterinary Science must go through a special examination, take a dissertation and defend it.

The average number of the veterinary students in both veterinary schools are now 672. Yearly, about 60 students obtain the degree of veterinarian.

The Veterinary Civil Service Authority is vested in the Ministry of Agriculture as the Veterinary Department of this Ministry.

The chief of the Veterinary Department (now Dr. F. Fischoeder) is the principal veterinary officer directly responsible to the Minister of Agriculture.

The Veterinary Department, one of the three departments of this Ministry, is divided into three divisions : the Organising and Personal Division, the Contagious Diseases Division, and the Municipal Veterinary Service Division.

Under the jurisdiction of the Minister of Agriculture there are the following institutions :—

(1) The Government Institute of Agriculture in Bydgoszcz possesses the Division of Animal Hygiene.

(2) The Government Institute of Rural Economy in Pulawy possesses the Veterinary Serological Division.

(3) The Laboratories of Veterinary Research in Warsaw, Lwow, Krakow and Bydgoszcz.

There are in Poland 16 provinces, called " Voyvodships "—Palatinates—Polish, " *Województwo.*" The Voyvodships are divided into counties (264)—Polish, " *Powiat.*"

The veterinary service in the Voyvodships is directed by the voyvodal veterinary inspector, and in the county by the county governmental veterinary officer.

The most important task of the veterinary service in Poland is the control of contagious and epizootic animal diseases. A few years ago rinderpest was fortunately wiped out in Poland. The successful action of " wiping out " was energetically directed by Colonel Vet. K. Zagrodzki.

Now the Polish Veterinary Service watches over Europe in order to guard her from this disease. The struggle with other epizootic diseases is carried on very intensively, but the financial allowance is not sufficient to deal effectively with those plagues of the farming community.

XUM

The Ministry of Agriculture keeps on the east border of the State a veterinary preventive cordon. This work is carried out by 16 veterinarians specially trained for this task.

The Municipality of Warsaw has its own veterinary service staff, composed of a chief veterinary inspector (now Dr. Mackiewicz), 13 district veterinary inspectors, and 12 veterinarians as the special veterinary staff at the abattoirs.

The other larger cities have also a special municipal veterinary service. In the smaller ones the duty of municipal veterinary officer is carried on by the county council veterinarian. The Municipal Veterinary Service is now largely introduced. In a very great number of municipalities there are already veterinary dispensaries and hospitals.

The budget of the Government Veterinary Service in 1927-28 is calculated in 5,883,995 zloty, which gives 18 per cent. of the budget of the Ministry of Agriculture. In the budget the sum of 3,850,000 zl. is allowed specially for the work concerning the wiping out of the epizootic animal diseases.

The Army Veterinary Service is enclosed in the Ministry of War as one of four divisions of the Medical Department. The Veterinary Division is divided into three sections: (1) The General Section—organisation, mobilisation, education, regulations, promotions, rewards, etc.; (2) The Animal Treatment and Hygiene Section; (3) The Budget and Material Supply Section.

One of two Assistant-Directors of the Medical Department, with the rank of Brigadier-General, is a veterinary surgeon, and Chief of the Army Veterinary Service. He is authorised to refer directly to the Minister or to the Vice-Minister of War all affairs regarding the technical veterinary subjects. This position is now held by Colonel Vet. K. Zagrodzki.

The Army Veterinary Service has two central institutions: the Army Laboratory of Veterinary Researches and the School of Non-Commissioned Officers of Army Veterinary Service, with two branches —sanitary branch and shoeing-smiths master's branch.

In each corps area there is a Chief of the Army Veterinary Service, who holds the rank of colonel.

To each of such units, as a cavalry regiment or an artillery regiment and to the Cavalry and Artillery Schools, a veterinary officer is attached.

In the Central Cavalry School there is a Veterinary Section, serving as a probationary training ground for the Veterinary Service. To this school are directed only graduated veterinarians possessing a stage necessary for receiving the rank of second-lieutenant in the Cavalry Reserve. These candidates are such veterinary students, who

during their studies were the nominees of the Ministry of War. After the war all veterinary surgeons from the rank of lieutenant to major, inclusively, were obliged to go through a short training course in this school.

At the Army Laboratory of Veterinary Researches there are three-monthly professional training courses for military veterinary surgeons. These courses all the military veterinary surgeons, without regard to rank, are obliged to go through.

The active list of the Army Veterinary Officers Corps shows 190 veterinary officers: Colonels, 15; lieut.-colonels, 25; majors, 53; captains, 68; lieutenants and second-lieutenants, 29. The Brigadier-General Veterinary Officer, Chief of the Veterinary Service, is entered on a list of the Corps of Generals.

All the Polish veterinarians join the veterinary associations. There are veterinary associations in Warsaw, Lwow, Krakow, Poznan, Torun, Wilno. Besides there exists a Professional Veterinary Confederation for civil veterinarians. The associations have chiefly scientific duties, the Confederation only professional ones.

The Polish Veterinary Press is represented by two monthly reviews: (1) *Przeglad Weterynaryjny* ("The Veterinary Review"), published in Lwow for 41 years, editor Prof. Dr. Z. Markowski, now Principal of the Veterinary Academy in Lwow; (2) *Wiadomosci Weterynaryjne* ("The Veterinary Record"), published in Warsaw for nine years, editor Colonel Vet. Dr. K. Millak. This review contains a large space devoted to the abstracts from foreign veterinary reviews of almost the whole civilised world. Moreover there exists, published by the Veterinary Academy in Lwow, the quarterly review, *Rozprawy biologiczne z zakresu medycyny weterynaryjnej, hodowli i rolnictwa* ("The Biological Essays Regarding Veterinary Medicine, Breeding and Agriculture").

The Professional Veterinary Confederation publishes the review, *Zycie Weterynaryjne* ("The Veterinary Life").

VETERINARY SERVICE AND THE VARIOUS AGENCIES RESTRICTING SUCH SERVICE.*

By F. A. ZIMMER, D.V.M.,
State Veterinarian, Columbus, Ohio.

LEST anything herein be construed as a direct attack either upon a group of agencies or an individual agency and to create unrest on our sea of perturbed waters, emphasis is placed upon the fact that

* Read before the Ohio State Veterinary Medical Association, Columbus, Ohio, January 11-12, 1928. An abstract from the *North American Veterinarian*, April, 1928.

XUM

the end in view is that of making veterinary service more useful and to establish the proper relation between agriculture and veterinary medicine.

I realise that the great majority of subjects presented deal with things concerning the services and efficiency of the veterinary profession and its organisations.

Most of these thoughts are expounded in such an optimistic and laudatory manner as to leave us temporarily satisfied with ourselves, individually and as a group, with the effect that the advice and philosophy received gradually subsides when we realise that we have been looking at ourselves through the wrong end of the telescope.

I am content to have voluntarily selected the veterinary profession with its course of training, designed to minister to the ailments of dumb creatures, but I am not satisfied to have our work restricted by intruders of unqualified agencies.

It might be well to pause at this point and ask two questions, the answers to which may or may not be given in this paper, namely: Is the veterinary profession too young or too timorous to grasp the idea that there is a legally constituted veterinary profession? And, do we have too few unafraid and unhampered leaders who are satisfied that "all's well" with the veterinary profession?

A Useful Profession.

I am sure that all veterinarians are proud of the achievements of the veterinary profession and I am convinced that the general public is uninformed about our activities and unlimited service. Few people realise and appreciate that except for the veterinarians, infectious and contagious diseases of domestic livestock, including poultry, the profitable production of livestock would be an utter impossibility. Proof of this is the unmistakable evidence of history to the effect that any state or nation is in danger when its livestock industry begins to decay through the ravages of diseases which could have been controlled.

As protectors of public health, veterinarians are rendering a service that prevents the contamination of milk and meat with tuberculosis and other infections. You will recall that it was the bureau of animal industry that discovered that Texas fever was transmitted by a tick and that this lead to the discovery of other insect-borne diseases. If thought necessary, one could point out numerous discoveries of the veterinary profession which the citizens of our state enjoy unconsciously, and yet the public estimate and lack of acquaintance are nothing less than amusing to those who know the accomplishments and work of the veterinarian.

XUM

Organization of Agriculture.

Agriculture in Ohio was not well organised 25 years ago. Veterinarians were scarce, and being engaged chiefly in the treatment of horses, their contact with agriculture was limited. But within the last few years, assisted by two acts of congress, agriculture has organised.

The Smith-Lever law created the farm adviser or county-extension system. The Smith-Hughes law created vocational training in agriculture in the high schools, under which developed boys' calf and pig clubs. Supplementing these organisations are other varieties of special ones. In Ohio we have 200 agricultural teachers and 80 county agents. Quoting the extension department: "While these systems, on account of their rapid development, had some difficulty in 'finding themselves' at first, to-day we see in them a wonderful organisation, taking up all matters pertaining to rural life." We are informed that an organised agriculture is an efficient agriculture and that veterinary medicine has nothing to fear because one of the great divisions of agriculture is animal husbandry which cannot be efficient without veterinary medicine. But, after reviewing the field of organised agriculture, we find that the veterinary profession was not made a part of this organisation. We have been left on the sidelines as bystanders or playing as a substitute. We must, therefore, recognise the fact that a questionable policy for the handling of the veterinary profession has developed through this organisation. The veterinary profession is looked upon as a kind of ambulance service to call upon when animals are sick, as a kind of freak with mysteriously acquired accomplishments instead of as an institution charged with the full responsibility of protecting the health of animals and in some instances, of man. The veterinarians of the World War know that this idea prevailed universally in military circles where they were thought of as handy men to call in when an animal was sick, but not as sponsors for the entire animal-health situation. It took a military crisis to expose the fallacies of such an idea and it may take a similar crisis to expose it in civil life.

Show no Interest in Us.

Agriculture has given no serious thought to building up and maintaining a veterinary profession, and the exponents of the present agricultural policies seem to care little where we are trained, how we make a living, who recruits the ranks of our profession, or what we represent as a unit of the general scheme. This means that agriculture lacks appreciation of the type of veterinary service it enjoys and is making the mistake of promoting a dangerous programme thought good enough to protect the health of animals.

XUM

We believe that agriculture wants to protect animals against disease but it is taking a course with dangerous tributaries, of wrong methods, and a wrong system. *It tolerates quackery by sending its agents into the field to teach quackery* [Italics ours—Editors] and evidently does not realise that a little knowledge is dangerous.

Two Systems of Veterinary Education.

Quoting from veterinary literature (*The North American Veterinarian*) : " The two systems in operation are supported from the same source and both are financed from the same budget. A considerable amount of public money is expended to maintain these two systems. It appears that one competes with the other. The veterinary school has for its inspiration the science and art of veterinary medicine. The other, which is the system organised agriculture is developing, consists of educating the layman to treat his own animals by means of lecture on veterinary science, bulletins, circulars, and direct field demonstrations. This system finds a helpful ally in the columns of the agricultural papers and livestock journals. In other words, the veterinary schools train a few men each year who must go out into the world and compete against the other whose student body is composed of thousands. The veterinary schools and the professions are numerically weak but proficient, the other large and unqualified but powerful by reason of its support and the free advertising it receives. Judging from the activities of the graduates of one system we must believe that a different interpretation has been placed upon the veterinary subjects taught to them than was intended by the veterinarians who are doing the teaching. It might be, however, that many veterinarians teaching in agricultural colleges do not confine their teaching to subjects for which they are properly prepared. The continuation of these two conflicting systems may lead us into an era of legalised quackery on a large scale with no assurance of establishing a sound educational programme for our vast livestock interests."

Since we are beginning to understand the cause of our troubles and realising that our destiny hinges upon changing these conditions, we believe it our duty to assist in every possible way to set such conditions right and not continue to follow the minor role of stepping in to treat animals after the amateur fails. The late Dr. John Adams said : " If it seems expedient to encourage the farmer to immunise his own hogs or to do his own castrating or dehorning or attempt any other of the many measures which require unusual skill or rare judgment, and are therefore regarded strictly the work of the trained veterinarian, the instruction should be every bit as searching as that given the

veterinary student working for his degree." This raises the question, why teach any veterinary medicine to students other than those enrolled in the veterinary colleges, and if so, why not give such students a course of training in medicine, law, and dentistry and other branches of science also ?

Various Agencies and their Relations to the Diseases of Swine and Poultry.

In 1907 anti-hog-cholera serum and virus came into use as a means of preventing and eradicating hog cholera. It was, of course, intended that such profits be employed with the sanitary measures essential to the best results. To-day we find that 3,500,000 hogs are lost every year from cholera at a cost of $62,000,000, and that hog cholera is still the most destructive disease of swine. One of the explanations of this deplorable condition is undoubtedly the hit-or-miss policy adopted for the use of serum and virus by the swine owners, since these were discovered. In fact, in this state we have farmers who insist they can immunise hogs as well as veterinarians. Some states have passed laws permitting the administration of these products by farmers, and in other states efforts are being made to pass laws permitting the use of other biological products by all classes regardless of qualifications. Who is responsible for this ? Certainly, the farmer is not entirely to blame. Hog cholera has been the subject of many bulletins which appear to have helped to bring about these adverse conditions. The authors of such bulletins invariably fail to realise the fact that a study of any scientific subject is not easy to master and overlook the fact that the layman is not capable of making a diagnosis of the disease at hand. These bulletins always contain carefully written directions on administration and seldom mention the advisability of consulting the veterinarian. Another factor is the extension service having headquarters at the universities. The inducements to treat their own hogs are often made to farmers in order to get them to join the farm organisations and thus save more than the amount of the annual dues. In many counties of our states, extremely limited in Ohio however, county agents devote a large share of their time to immunising hogs against cholera and considerable time in advocating the farmer-vaccination system. Pamphlets, circulars, and radio talks play an important part.

A Radio Talk from Illinois.

Just a few months ago I listened to a radio talk from a Columbus station by a representative of a farm organisation from Illinois. Quoting this speaker : " Over in Illinois we increased our membership from 50 to 60,000 within a short time under a promise that all member

of the organisation could obtain anti-hog-cholera serum and virus which they themselves could use on their hogs. During the last year 30,000,000 cubic centimetres of serum was purchased and used under this plan, and no farmer was able to obtain these products unless he was a member of the organisation. The county agent did not visit a farm nor demonstrate the use of the serum and virus unless the farmer was a member. The farmer who was not a member could not even see the serum, nor get close enough to smell it." You can easily understand why this talk caused unrest and brought numerous requests to the state veterinarian's office from farmers interested in treating their own hogs.

We have no exact figures as to the losses sustained on account of faulty administration, but we do know from statistics compiled that the veterinarians save 15 per cent. more hogs than the laymen, owing to making more accurate diagnoses of herd conditions and judgment employed in the administration of the serum.

Certain serum companies are also factors encouraging the use of serum and virus, other biological agents, and medicinal products by farmers. *It is an acknowledged fact that we have serum companies who bid for the patronage of the farmers one day and for that of the veterinarian the next day.* [Italics ours—Editors.] A few anti-hog-cholera serum producers sell only to graduate veterinarians. This is a laudable departure and we believe a good trade policy. Later, other producers adopted the same policy and were believed sincere, but unfortunately some of them, now looked upon as pirates, had no intention to actually live up to such a policy.

As a result of all this many laymen, quacks, and others, are being made to believe they can treat domestic animal diseases as well as the trained veterinarian, and that veterinary medicine is nothing more than a matter of getting supplies. *In some instances we have ourselves to blame, we have graduate licensed veterinarians who purchase most of their supplies from companies which "double-cross" the profession, and this same group of veterinarians are the first to condemn the exponents of quackery and the authorities charged with enforcing the veterinary practice laws.* [Italics ours—Editors.]

The veterinary profession should not leave the impression nor proclaim that we are preferred individuals who can purchase something others cannot. As a matter of fact, anyone in the United States who has the price can obtain any veterinary journal† or publication, any instrument or any drug, and it is ridiculous to make a claim to the contrary.

[† No one except a graduate veterinarian can become a subscriber to the *North American Veterinarian*.—Editors.]

We still have veterinarians who boast of rapid fire work; who contract to immunise hogs at a price which means underdosing; who overcharge for the serum; who are careless about attempting to immunise sick herds; and who practice slipshod methods. To correct these conditions and to demonstrate to the swine owners the true value of serum and virus, it remains for the veterinary profession to see that the immunisation of swine with these products is properly done and combined with proper sanitary measures.

Poultry.

As no phase of farm development has been so rapid as poultry husbandry, it has been a profitable field for outside agents to exploit. Poultry is the most widely owned group of livestock. Ninety per cent. of Ohio farmers maintain a poultry flock and the main menace of this huge industry is disease. The incidence of disease has increased with the development of the farm flocks and as a consequence innumerable agencies are engaged in educating farmers on the use of thousands of remedies. Many public and private agents are visiting farms to diagnose disease and make recommendations. As a rule these men are not trained on poultry diseases, but have a keen conception of poultry diseases obtained from articles, bulletins, and other literature issued by the veterinary profession. These men do not hesitate to state that the veterinarian is not familiar with poultry diseases but they fail to admit that whatever knowledge they possess came primarily from the veterinarian. To-day, any owner of a flock of poultry, within one hour or less, can obtain questionable advice free of charge from a local agricultural teacher, county agent, or commercial concern interested in selling nostrums recommended as cures for poultry diseases. This kind of service will increase, if the veterinary profession does not pay serious attention to poultry. Already several veterinarians in this state devote a large part of their time to poultry practice, but unless veterinarians in general do not prepare to take full charge of the poultry-disease situation, others will, and the veterinary profession will have lost an opportunity to broaden its usefulness. Another factor is the spectacular exhibition of *post-mortem* examinations on swine and fowls in the presence of whatever type of audience the agent is able to gather around him. This is termed a "free clinic." The plan is illustrated by the following advertisement of one of them:

"For the last two years we have been holding *post-mortem* clinics from Pennsylvania to Colorado, and from Dakota to Texas. We employ a force of specialists on poultry and swine diseases in our clinic and research department. These men devote all of their time to this

work. They go from town to town where we have agencies, spend a whole day with the poultry and pig owners—not to sell them anything, but to help them with all problems relative to care, feeding, and disease.

" Poultry and hog raisers are invited to attend these clinics which are free, and bring in any sick or out of condition specimens they may have. These specimens are killed and a *post-mortem* examination held. In each case, the cause, the treatment, and the prevention of the disease is fully explained."

These companies have licensed graduate veterinarians associated with them who do not hesitate to give instruction to our boys on the *post-mortem* diagnosis of poultry diseases. These clinics naturally raise a regulatory question in that they may be a means of disseminating diseases. The bringing of sick and dead animals to a common centre, exposing their carcasses, possibly teeming with virus or bacteria of unknown nature to an audience that will later adjourn to as many flocks and herds as it had members, certainly would be recognised as a means of spreading diseases. Such demonstrations have been held within the boundaries of our state, and I am of the opinion that a regulatory order should be issued prohibiting all public clinics of this nature without permission from the department charged with the control of infectious and contagious diseases. We mention this to illustrate the dangers of quackery and unwisely commercialising scientific knowledge.

Agencies Affecting Small-Animal Practice.

Recently, in reply to a questionnaire relating to this branch of veterinary practice, we determined that :

1. We are greatly hindered in practice by a multitude of " patent " dog remedy companies a few of which have launched an extensive advertising campaign in all the leading magazines and newspapers. A large window display of the remedies is in every corner drug store, and the druggist is always on the alert to praise them and to hand out their free booklet on diseases of dogs and their treatment.

2. The dog food companies are gradually adding dog tonics, soaps, and medicines to their list of dog foods. Following the advertising scheme of the " patent " medicine companies, they too, are flooding the country with booklets giving complete information on feeding, care and treatment of diseases. Much of the information is false and misleading, and the minds of the dog owners are so confused that they are not prone to accept the veterinarian's diagnosis.

3. Another hindrance is the veterinary column of the dog papers, where owners describe in detail the disease he wishes treated and the

veterinarian employed answers accordingly, naming drugs, dosage and line of treatment to pursue. In other words, for a small fee, the owners are given details which lead them to patronise this service when their dogs are sick.

4. Another menace in this category of reputable drug houses handing out circulars and pamphlets at fairs telling of the merits of such well-known drugs as carbon tetrachloride as a vermifuge, and that their capsule can be bought at the drug store at five cents a dose. It gives one a strange feeling to have a client walk in to one's office and ask for 50 cents' worth of carbon tetrachloride as if diagnosis was of no consequence whatsoever.

5. Dog breeders who make a business of boarding as well as selling dogs, maintain a circle of customers by requesting those who buy their dogs to bring them back at stated intervals for " worming " or any other form of treatment. Their knowledge is based upon free literature. Occasionally they employ a veterinarian to find out what he knows and too often the veterinarian is too free with his information. They trim ears and amputate tails and oppose all serum and vaccines because these are out of their reach. The objective is to keep the dog owner away from the veterinarian.

The average person is a gullible sort, listens to their line of gab, and really believes what he is told.

Suggestions.

The author makes a number of pertinent suggestions as to how the veterinary situation may be gradually improved. Among these are avoiding the endorsement of unknown proprietary remedies; qualifying for greater usefulness in a broader field; better support of the veterinary associations including obedience to the ethical policies; establishing a closer relation with livestock organisations; seeking a working relation with agricultural leaders; and carrying out a definite plan of publicity.

THE INFINITELY SMALL.*

By TOM HARE, M.D., B.V.Sc., M.R.C.V.S.,

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In all branches of medical science complaint is heard frequently of the great increase in literature with which the specialist finds it necessary to familiarise himself, so that a collation and survey of

* Being a review of " Filterable Viruses," edited by T. M. Rivers; published by Baillière, Tindall & Cox, London, 1928. Price 34/- net.

known information compiled by experienced workers is always assured of an immense welcome. The great value of these reviews appears to be fully appreciated by America, to whom we in England are under yet another obligation for a presentation " in a systematic manner of some of the chief problems encountered " in the study of the filterable viruses.

The editor has selected five of his colleagues at the Rockefeller Institute of New York—Alexis Carrel, Cowdry, Olitsky, Glaser, and Bronfenbrenner—together with Professors Amoss, Mudd and Goodpasture, and Dr. Kunkel, all well-known American investigators of the " infinitely small " to assist him in the preparation of a book, which " reflects precisely the state of affairs as it now exists in the field of filterable viruses."

Since Loeffler and Frosch, in 1897, discovered the filterability of the virus of foot-and-mouth disease, at least some 60 different diseases of mammals, birds, fish, insects, plants, and bacteria have been assigned to the group of filterable viruses. Not all of these diseases have been found to satisfy the criteria by which, for example, the foot-and-mouth virus is identified. Furthermore, filterability is a characteristic which the viruses " share with certain small bacteria and vibrios, and also with some spirochaetes and protozoa." In the first chapter, comprising a general survey of the group properties, which was published in the *Jour. Bact.*, 1927, XIV, 217, the editor gives a list of the majority of the diseases which have been placed in the filterable virus group by different authors. He states that " in the past all attempts to classify these diseases have been unsuccessful, and there is every reason to believe that such attempts are still premature." " Enough has been said to convince one of the heterogenity of the diseases listed in the table. In fact, they exhibit so many differences that a discussion of the filterable viruses almost amounts to a separate discussion of each disease. Such a state of affairs is due to the fact that the filterable virus group has been used to a considerable extent for the indiscriminate segregation of infectious diseases of unknown etiology. Therefore, it is not unlikely that some of them will be shown to be caused by small bacteria or protozoa. When this occurs, such diseases should be removed from the filterable virus group and given their correct position in the classification of disease."

These difficulties in classification will be more readily solved once it has been found possible to define the nature of the filterable viruses. As yet it is not known whether any one virus is an animate ultramicroscopic organism or an inanimate chemical principle. Carrel, in the most inspiring and yet shortest chapter of the book, entitled " Tissue Cultures in the Study of Viruses " offers encouragement for

XUM

the belief that by their cultivation in the presence of living cells it may be possible to distinguish the animate from the inanimate viruses.

The difficulties in evaluating the filterability of the viruses are fully recognised after reading Mudd's chapter on " Filters and Filtration," in which the types and uses of filters are fully discussed. " The apparent simplicity of filtration has been a pitfall, leading usually to incomplete recording of essential data and frequently to unwarranted conclusions." " In the studies of the filterability of active agents there should be recorded, in addition to full biological details, any preliminary manipulation of the filter or of the material to be filtered ; the type and size of filter used ; whether filter is new or old, and, if used, for what purpose ; air-pressure test of filter ; content and dilution of fluid to be filtered, including active agent, control organisms, colloids, electrolytes, and approximate reaction ; filtration pressure ; volume of filtrate ; the stage in the filtration process at which specimens are collected for tests ; media and animals into which specimens of the filtrate are inoculated."

As yet the viruses are known only to multiply in the presence of living cells, some in epidermal cells, some in nerve cells, others in cells of the mesoderm, and in consequence a great deal of attention has been given to their influence on the cell morphology. The cytological problem is fully presented by Cowdry. " One of the most striking attributes of many diseases caused by filterable, and as yet ultravisible, viruses, is the development of large and conspicuous " inclusion bodies " within the cells. Cowdry shows that a number of the viruses fall within three cytoplasmic groups dependent upon the location of " inclusion bodies " within (1) the cytoplasm ; (2) the nucleus ; or (3) both cytoplasm and nucleus of the cell. Since the publication of this book the reaction of cells to the parasitic viruses has been further surveyed by Rivers under the title, " Some general aspects of pathological conditions caused by filterable viruses " in *Am. Jour. Path.*, 1928, IV, 91.

The editor, by refraining from any attempt to discuss each individual member of the group, has made the volume a more powerful instrument for teaching. A detailed description of a few examples of viruses affecting different species of host proves sufficient to demonstrate the unity of the problem, whether in bees or in beast. Amoss writes of poliomyelitis in man ; Olitsky considers virus disease of domestic animals, as exemplified by foot-and-mouth disease and vesicular stomatitis.† Fowl pox (*Epithelioma contagiosum*) is de-

† Since Olitsky's chapter was written, the Third Progress Report of the British Foot-and-Mouth Disease Research Committee has been published (1928) by H. M. Stationery Office (Price 5/- net).

scribed by Goodpasture, and Glaser devotes a most interesting chapter to sacbrood of honey bees, and to the polyhedral diseases of insects. The reader of this chapter will agree with Glaser's statement that "insects offer remarkable opportunities for the quantitative study of viruses—the virus material is easily procured and the healthy insects can be readily obtained and cheaply reared in enormous numbers," without, he might have continued, worrying His Majesty's Secretary of State for Home Affairs! Kunkel in his general survey of the virus diseases of plants shows that they are more readily subject to classification than the virus diseases of mammals. The final chapter on bacteriophagy by Bronfenbrenner is an excellent survey of the studies on the Twort-d'Herelle phenomenon.

A most valuable feature of the volume is the extensive bibliography at the end of each chapter; that of Rivers alone contains 539 references to the literature of filterable viruses. The plates, drawings and photographs are worthy of the book; a coloured plate illustrating Cowdry's text on the "inclusion-bodies" is exceptionally good. To present so much clearly expressed knowledge within 428 pages of a well-appointed volume at so reasonable a price is an achievement for which we offer our sincere gratitude to a team of first-class workers.

A SURVEY OF THE DEVELOPMENTS OF RESEARCH INTO BOVINE CONTAGIOUS ABORTION DURING THE PERIOD 1895-1928.

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(*Continued from p.* 350.)

Section IV.

Schroeder and Cotton[32] in 1925 reported that the guinea-pig could be infected by instilling a drop of *B. abortus* suspension into one eye. The location of lesions was shown to afford no indication of the portal of entry of infection. The experiments were extended to cattle. A pregnant heifer, whose serum was negative to the agglutination test, received one drop of *B. abortus* suspension in one eye. Her serum reacted 36 days after, and she later expelled a premature dead calf. The eye, therefore, was regarded as a possible portal for natural infection in cattle.

In their guinea-pig studies they found that a nine-year-old strain of *B. abortus* could be recovered from the spleen two months after the injection of infective material had been made, yet the spleen

was free from macroscopic lesions. This was a valuable observation, as it showed the advisability of not relying entirely on the production of the usual typical nodular lesions, as evidence of infection, in guinea-pigs employed for diagnostic purposes, particularly in the case of strains of low virulence.

The negative findings of Schroeder and Cotton and other workers *re* the transmission of infection by the bull were further strengthened at this period by a report of experimental work performed by Lubbehusen and Fitch[43], who found that bulls could not be readily infected per os or urethra. Examination of semen from bulls whose genitalia had been artificially infected was in all cases negative, and no abortion bacilli could be found in the genital organs of bulls which gave positive serological reactions.

The great need for the standardisation of the agglutination and complement fixation tests which had already been urged by other workers was again stressed by Schroeder and Cotton[32], Boerner and Stubbs[34], and Fitch[44]. Fitch, in particular, made comparisons of the tests performed by various laboratories, and showed the wide and unnecessary divergences in their tabulated results. In his own experimental work he found that complement fixing bodies were not only present before agglutinins had formed, but also in the case of a calf, persisted for two months after the agglutinins had disappeared. This indication of the greater diagnostic value of the complement fixation test appears to upset the view already expressed by other workers that both tests are equally efficacious, but until the minimum infective agglutination titre has been determined it is advisable to reserve judgment. Probably the correct view to take at present is that expressed by Boerner and Stubbs, that a combination of both tests is more accurate than either test alone.

In 1926 Huddleson and Carlson[44] devised a rapid method of performing the agglutination test. They pointed out that the electrical potential of an antigen suspension is reduced by increasing the concentration of the salt solution, and flocculation on the addition of positive serum is hastened. They showed that a heavy suspension of *B. abortus* (giving a reading of 4 mm. by Gates' Method of Standardisation) in 12 per cent. sodium chloride solution (plus 0·5 per cent. phenol), adjusted to a pH of 6·8, rapidly flocculated when mixed with a positive serum in certain proportions. By this method flocculation occurred in most cases in a few seconds, but they advised shaking again after five minutes and tabulating the results after fifteen minutes. They at first used tubes but later substituted glass plates. The same amounts of serum were used as in ordinary agglutination tests, and 0·04 cc. of antigen was added in each case.

XUM

They claimed that the results were parallel to those obtained by the usual slow laboratory methods, and suggested that the test could be applied by the veterinarian in the field, little apparatus being required.

In 1927 Craig[45] published valuable observations on the utility of the agglutination test in the isolation of reactors. The work had extended over a number of years. His interpretation of the test results was as follows. Agglutination at 1 in 50 or higher was regarded as a positive reaction, and complete agglutination at 1 in 25 as suspicious when the same serum gave an incomplete reaction at 1 in 50. Reactions were considered to be negative in which agglutination did not occur in dilutions above 1 in 25, and they were attributed to the presence of non-specific agglutinins.

He expressed the view that the interval between the onset of infection and reaction to the agglutination test is, in all probability, not longer than a month, and advised that second tests should be made after that interval of time.

Repeated tests showed that of 105 reacting cattle 12 ceased to react in one year, 8 in two years, 7 in three years, 1 in four and 1 in six years. The others showed little or no change in their reactions although tested annually for from two to seven years.

Craig was able to show that by the isolation of reactors he had been able to stamp out infection in five to six years. He was able to prevent leakage between the healthy and infected sections, and the abortions reached vanishing point in the latter.

In the same year Holtum[46] experimented with a double intradermal test, applying it to cattle in infected herds. The antigen employed consisted of a heavy suspension in carbol-saline of *B. abortus* killed by heating at 65° C. for 30 minutes. It was standardised to correspond with Tube 10 of Brown's Scale of Standard Opacity Tubes, and gave a measurement of 6 mm. by Gates' Method of Standardisation. It differed from that used by Reichel and Harkins for their single intradermal test (in 1916), in that the products of growth were not removed as the organisms were not subjected to washing. Several strains of the organism were used, but each antigen prepared consisted of one strain only. The intradermal reactions were controlled by the application of the agglutination test to the sera of the infected and control animals prior to their injection with the antigen. For agglutination purposes agar cultures of *B. abortus*, suspended in 0·75 per cent. saline (+ 0·5 per cent. phenol) were used. The suspension corresponded with Tube 2 of Brown's Scale, and gave a measurement of 2·8 cm. by Gates' Method. Guinea-pig inoculations of the centrifuged deposit from

milk were made in certain cases, particularly in those where the agglutination tests did not confirm the intradermal reactions.

Specific intradermal reactions were shown by 41 out of 87 animals tested. Of these 41 reactors only 24 were definitely positive to the agglutination test. In other words 17 reacted to the intradermal test which were indefinite or negative to the agglutination test. In 14 cases out of these 17 the local reactions were confirmed by the recovery of the organism from the milk-inoculated guinea-pigs. The 46 non-reactors were negative to the agglutination *and* intradermal tests. The injections did not give rise to any recognisable systemic reaction in any of the animals, temperature and milk yield being unaffected.

The same routine was observed in the carrying out of the test as is usual in the application of the double intradermal tuberculin test, and the injections were made at a shaved site on the neck of each animal.

The promising results recorded suggest that the test may prove to be of value to the practitioner.

The work shed further light on the interpretation of the agglutination test. Complete agglutination at a dilution of 1 in 25 was at the outset considered to be definite evidence of infection, and the experimentally controlled results indicate that the acceptance of positive reactions based on this low dilution was justified, and that the minimum infective titre may be still further lowered when more observations have been made.

The Relationship Between Bacillus Abortus and Micrococcus Melitensis.

The question of the infectivity of man with *B. abortus*, to which more attention has been paid during the last few years, is intimately bound up with the problem of the relationship which exists between *B. abortus* and *M. melitensis*, and it is advisable to complete this survey by briefly dealing with the investigations which have been made into these related problems.

The literature of the subject is reviewed by Evans[47] in papers published by the United States Public Health Service, and the writer wishes to express his indebtedness to this source for much of the information which follows. Where other sources have been used the appropriate references are given.

Micrococcus melitensis was first isolated by Bruce in 1887 from the spleens of human cases of undulant fever in the island of Malta. It did not receive this name, however, until he published a more complete description of it in 1893, two years before the discovery of *B. abortus* by Bang.

M. melitensis was for many years regarded as a coccus, and any rod-like forms encountered were regarded as dividing cocci or involution forms of the organism. It may be accepted that *M. melitensis* is by nature pleomorphic within narrow limits, and this characteristic it shares with *B. abortus* in cultures of which it is often possible to notice what are apparently coccal forms.

In 1918 Evans showed that the organisms closely resembled each other in their morphological, cultural, biochemical, serological and pathogenic properties. He later pointed out the similarity in the natural course of contagious abortion and Malta fever in cattle and goats respectively.

"Both cattle and goats may harbour the *Brucella melitensis* (group name used in the U.S.A. embracing both organisms) for years without evident impairment of health other than abortion; both species of animals may eliminate the organism in their milk for long periods although apparently in good health. In the cattle disease attention has been directed to the abortion of the fœtus because of its great economic importance. On the other hand in the goat disease attention was directed in the past chiefly to the infectiousness of the milk, and the abortion of the fœtus was not so much emphasised although it has long been recognised as a symptom of the infection."

Bevan[48] in 1922 recounted the case of a sick man in hospital at Salisbury, Rhodesia, whose serum agglutinated cultures of *B. abortus* in a dilution of 1 in 200. The nature of the illness was not determined, but Bevan himself thought it likely that the case was one of *B. abortus* infection.

Carpenter[44] working in the U.S.A. a few years later studied ten cases of undulant fever in man, and recovered in each case an "organism indistinguishable from *B. abortus*." Five pregnant heifers, which were non-reactors to the agglutination test for contagious abortion, were each given intravenous injections of cultures of different strains derived from these human cases. They all aborted five to twenty days after receiving the injections, and an organism resembling *B. abortus* was recovered from the fœtus, placenta and colostrum in each case. One heifer had the organism present in her udder 231 days after abortion.

No opinion can be expressed on these cases, but it is illuminating to note that bovine abortion has been experimentally produced by *M. melitensis*.

Evans inoculated a pregnant cow intravenously with a culture of *M. melitensis* isolated from a human case of undulant fever. Forty-five days later the cow aborted a five months' fœtus, and the organism was recovered from the stomach and intestinal contents, the peritoneal

fluid and the colostrum. The recovered strain was shown to be serologically identical with the strain used for inoculation. Before inoculation the serum of the cow agglutinated *M. melitensis* at a dilution of 1 in 10 and *B. abortus* at a dilution of 1 in 20. After inoculation it agglutinated both organisms equally, and after a lapse of nearly two months the titre was as high as 1 in 320.

Many of the earlier observations of Evans have been confirmed by workers in various countries, and a brief account of some of their investigations is desirable.

Meyer and Shaw,[49] working in the U.S.A., compared 21 cultures of *M. melitensis* with 32 of *B. abortus*, and found that the pigment produced was always more intense in the case of the latter. The cultures were grown for five days on gelose-glycerine or potato. After 20 days in bouillon glucose and lactose both gave an alkaline reaction and a characteristic reduction of concentration of H-ions.

Fleischner, Meyer and Shaw found that the test for cutaneous hypersensitiveness, which they regarded as being highly specific, did not differentiate experimental infections in guinea-pigs caused by *M. melitensis* and *B. abortus*. Burnet[50], working in Tunis recorded similar results. He also subjected each of four Malta fever patients to three simultaneous intradermal tests. Two antigens were prepared from *B. abortus*, one of bovine and one of porcine strain, and the third was prepared from *M. melitensis*. The three reactions were positive in all four cases, and the porcine strain of *B. abortus* gave the strongest reactions.

Meyer and his associates studied the pathogenicity of *B. abortus* and *M. melitensis* for guinea-pigs, and found the former to be as a rule more invasive and virulent, but the pathological changes were of a similar nature in both cases. Khaled, working in Egypt, on the other hand, found *M. melitensis* much more virulent than *B. abortus*. Huddleson found that the tissue changes in guinea-pigs inoculated with virulent strains of both organisms could not be differentiated.

Khaled immunized a monkey with *B. abortus*, and found that it gave a mild reaction to an infecting dose of *M. melitensis* as compared with an untreated control monkey. He obtained similar results with goats.

Mazzi, in Italy, working with rats, found that anti-abortus serum protected against *M. melitensis* as well as against *B. abortus*, and that anti-melitensis serum similarly protected against *B. abortus* and *M. melitensis*. Burnet inoculated two human subjects with live cultures of old porcine strains of *B. abortus*. Subsequent inoculation of a virulent caprine strain of *M. melitensis* produced a mild infection in one case and no ill-effects in the other.

XUM

Evans cites a number of cases of undulant fever in man, occurring in the U.S.A., in which infection was found to be due to the "abortus variety of *Brucella melitensis*." In one case the serum agglutinated *B. abortus* in a dilution of 1 in 2560. The infections were traced to cow's milk or some form of contact with cattle or swine. Similar cases of human infection have been reported in South Africa, Italy, Palestine and the Dutch East Indies.

Simple agglutination tests, it is now generally agreed, do not allow one to distinguish between *B. abortus* and *M. melitensis*, and Evans has shown that agglutinin absorbing properties constitute the only recognised point of distinction between them.

The application of agglutinin absorption tests enabled her to make satisfactory serological classifications which have profoundly modified earlier views regarding the relationship of the organisms.

Sixty-eight strains of *Brucella melitensis* were tested, and they were differentiated into eight serological groups.

The majority of bovine and porcine strains fell into one large group (33 strains), which was designated variety *abortus*. Five strains of human origin were of this variety. Another group composed of twelve strains of human, bovine, caprine and equine origin, was designated variety *melitensis A*. A third group of Mediterranean origin was designated *melitensis B*. Other groups were found which could not be classified as belonging to any of these three, although some of them appeared to be closely related.

Evans shows by means of a chart that the serological relationships between the eight *melitensis-abortus* groups unite them into an intergrading series, and quotes Jordan and Kellogg as expressing the generally accepted view of biologists as follows:—"A series of fully intergrading forms, however varied at the extremes, is usually regarded as forming a distinct species. * * *. If we find actual intergradation, the occurrence of specimens intermediate in structure, the term subspecies is commonly used for each of the recognizable groups thus connected."

These researches, therefore, led Evans to concur with the opinion already expressed by Burnet, that *B. abortus* and *M. melitensis* are so closely related that they must be regarded as serological varieties of one and the same species of organism. It appears likely that this conclusion will become generally accepted by bacteriologists.

As no cases of undulant fever due to bovine strains of *B. abortus* have occurred in this country, it seems likely that climatic conditions play a large part in producing what may be called "intermediate" types of the organism which are capable of causing disease in man.

XUM

Conclusion.

It is fitting at the conclusion of this survey to consider briefly the present position. The wide field covered by research has led to the development of preventive and curative measures, but the application of them has not in any marked degree reduced the incidence of the disease in any of the countries where they have been practised.

Vaccination.

Vaccination with dead cultures of *B. abortus* has not been shown to produce a satisfactory degree of immunity, although agglutinins are formed in the blood of cattle so treated. Vaccination with a live vaccine is the least of two evils in the case of a herd which is heavily infected, the rationale of such vaccination, before service, being that clean animals so treated receive infection at a "safe" period. The degree of immunity produced is variable and its nature is by no means understood. It appears to be likely that the generation of antibodies throughout the system results in an inhibitory action on the part of the blood, which may then be capable of "damping down" any uterine infection which may subsequently take place to such an extent that infiltration of the developing fœtal apparatus is prevented.

Too little is yet known about the attenuability of *B. abortus* for us to consider that any live vaccine yet devised is incapable of causing abortion. Work along similar lines to those pursued by Calmette and Guerin in their production of B.C.G. vaccine for tuberculosis, may eventually result in the development of an avirulent live vaccine for bovine contagious abortion. It must be remembered that the disease is a chronic one, and that *B. abortus* is by nature of low virulence. It is, therefore, not only more difficult to attenuate it than an organism of greater virulence, but also more difficult to estimate the degree of attenuation produced.

Isolation.

The saying that "prevention is better than cure" is supremely applicable to such an insidious disease as contagious abortion, and it is to be hoped that isolation methods will eventually take precedence of any form of vaccination. Such methods have not as yet received anything like the attention they deserve. This is in part due to the fact that so many farm premises are so constructed that the segregation of animals presents great difficulties, and in part to the fact that diagnostic methods have not been standardised and rendered more efficient. The development of tests of greater delicacy than have been available in the past, will, it is to be hoped, in time, make it

possible to detect the disease earlier and thereby make the isolation of reactors more practicable.

It is reasonable to suggest that facilities for complete herd tests should be placed more within the reach of the average farmer.

No untested animal should be taken into a clean herd, and every farmer who builds up a new herd should be encouraged to enlist veterinary aid and only accept animals which are by test proved to be free from infection.

A closer co-operation between practitioners and laboratory workers would lead to the initiation of more extensive field experiments than have yet been performed (particularly in Britain), and to a clearer understanding on the part of the latter of the problems confronting the former. The development of better methods of dealing with the disease, depends, in the opinion of the writer, on making this co-operation more complete.

An attempt has been made to give a balanced account of the various researches which have been conducted, and to make any critical remarks in a suggestive rather than dogmatic manner. As the compilation of information from so many sources has been no light task it is hoped that any errors or omissions will be excused.

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(47) Evans, Various papers in *Hygienic Lab. Bulletin*, No. 143, U.S. Public Health Service, 1925.
(48) Bevan, *Trans. Rey. Soc. of Trep. Med. and Hygiene*, Vol. 15, 1922.
(49) Meyer and Shaw, *Jour. Inf. Dis.*, Vol. 27, 1920.
(50) Burnet, *C.R. Acad. Sciences*, T. 175, 1922. *Extr. Bull. Inst. Pasteur*, Vol. 21, 1923.

Clinical Articles

Granulomata (Origin Unknown) of the Small Intestine of a Mare.

By S. M. WOODWARD, M.R.C.V.S.,
Birmingham.

SUBJECT.—A black cart mare, aged 18 years, which was purchased by the present owner 12 years ago. The mare had never borne a foal; she was of a vicious disposition especially in the stables.

HISTORY.—Save for occasional swelling of all four limbs which the owner termed "humours," there was no previous history of illness.

About 12 months ago the mare had an attack of colic which was attributed to her habit of eating her bedding. During the past year the mare had further attacks of colic, with an uneventful recovery after about 48 hours' duration of symptoms. Between the attacks the mare worked well and preserved very good condition. Latterly, however, the attacks of colic occurred at shorter intervals, approximately every six weeks, the last attack occurring on June 4th, when the owner decided to have the mare destroyed. Throughout the past 12 months there had been no obvious loss of weight; in fact, the horse-keeper was of opinion that the mare had worked better throughout the past winter than at any previous time in her history.

During the attacks no blood or tissue shreds had been observed in the fæces, neither had any eructation or vomiting ever been noted.

POST-MORTEM EXAMINATION.—The small intestine was the only organ revealing any macroscopic abnormality, viz. six massive tumours on the luminal surface of the bowel, together with a slight intussusception. These specimens were sent on to Professor Tom Hare of the Department of Pathology, Royal Veterinary College, to whom I am indebted for the following report:—

"The portions of small intestine of the mare revealed six rounded, bulky, soft tumours protruding into the lumen of the bowel. The smallest tumour was about the size of a goose's egg and the largest that of a cocoanut. The centre of each one of the tumours was ulcerated and covered with a putty-like necrotic material. The peritoneal surface of the bowel over each tumour was thickened and opaque.

"One portion of the small intestine revealed an intussusception, the apex of the intussusceptum consisting of the smallest of the tumours already described. As there was no congestion of the mesentery of the intussusceptum or of the wall of the intestine proximal

to the intussusception it would appear that the intussusception occupying 4 in. of the bowel, occurred either at, or immediately preceding, the death of the patient.

" By histological examination the tumours are revealed as granulomata. There was no microscopical evidence of neoplasia, neither was any evidence obtained as to the cause of the long-continued enteritis."

Curious Case in Alsatian Puppies.

By E. J. LAINÉ, M.R.C.V.S.,
Guernsey.

An Alsatian bitch gave birth to eight pure bred pups seven weeks previously, six dogs and two bitches. They did exceptionally well, and nothing amiss was noticed until two were a little quiet and off colour. On examination one had a painful swelling half way down the ventral side of the neck and the other a discharging sinus in exactly the same position. Since then every one of the litter has been affected in quite a similar way. The pups were only seedy two days. The first day the abscess is noticed and the second day it has burst, leaving a wound about the size of a threepenny piece. No other treatment has been adopted than antiseptic fomentations, and the earlier wounds have healed perfectly. I have seen odd cases of abscesses in this region probably due to bites, but have never heard of eight in one litter being affected in exactly the same position.

A Calf Monstrosity.

ANONYMOUS.

Sole History.—Light weight crossbred short horn, six years old.

We were called in to assist a neighbouring veterinary surgeon, who had injured his hand.

The cow had been in labour since the previous day and two fore feet were presented. On examination the head was found to be back, and this was put into a correct position and traction applied without result. Further examination revealed a tail and two hind feet below the brim of the pelvis and an attempt was made to push those back, but without avail, so the head and the two fore limbs were amputated and retropulsion applied to the neck, with a view to getting the two hind feet up and delivering the calf backwards ; but this failed. Cow was now down and in an exhausted condition so she was slaughtered.

POST-MORTEM.—The enclosed photograph will give some idea of what the calf or calves were like. Although there were two complete skeletons there was only one alimentary canal which was continuous

through the pelvis. There was only one liver and one spleen and two kidneys, but each calf had a heart and a pair of lungs of its own.

Translation

Quintuple Gestation in a Cow.

By P. SLETTUM, Veterinary Surgeon,
Gjövik, Norway.

I DO not remember ever having read in the professional literature, nor otherwise having heard, of five calves in one birth; but this unique experience actually happened in my practice in 1926.

I was called to see the cow in question a fortnight before she was due to calve, and was told that she did not manage to get up on her feet, for which reason she had been lying down the last two days; she was very large-bellied. There was, however, no great difficulty connected with getting her up. With a little encouragement she rose by her own effort.

The cow was rather emaciated but the appetite was good, and otherwise she was quite well. But she was so enormously large-bellied that she presented a dismal sight.

I diagnosed two calves at least by examination per rectum. As mentioned above the cow was due to calve 14 days after the date of this attendance.

The birth, however, commenced in the morning on the eighth day after my first attendance, and I was called to see her the same evening. No fœtal fluid had escaped, but all day the cow was having violent labour pains.

The delivery was easily managed, save that it was rather difficult to find one's bearings in that exceedingly distended uterus. I had a little trouble in finding calf No. 1 and No. 2, and No 3. was easily found, but I had to seek a rather long while for No. 4. Hereby I thought that enough had been done, and said to the owner: "If there are still more calves, in God's name they may be where they are," a conclusion with which he agreed. Fortunately the fifth calf was born without further assistance. Out of this litter two were still-born, one died on the floor in the byre, whereas two were well in every respect when I left them. Later on, however, the two latter would not drink, for which reason the owner killed them that very evening. If I had been called in for attendance the same morning when the parturition was commencing all of them, presumably, would have been alive. The calves appeared to be born at the proper time, and were of the size of those miniature dogs which the Germans designate as "Zwerg-pinchers." After the delivery the cow was evidently feeling quite well, for she ate and drunk what was put before her. The following night, however, violent pains of labour set in, presumably the ordinary symptoms which follows the loosening of the fœtal membranes, and, unfortunately, the cow was slaughtered by the owner's orders without any reference to my opinion—From *The Norwegian Veterinary Magazine*, January and February, 1927.

J. B–J.

XUM

Review

Anthelmintics and Their Uses in Medical and Veterinary Practice.
By R. N. CHOPRA, M.A., M.D. (Cantab.), Professor of Pharmacology, Calcutta School of Tropical Medicine and Hygiene, and ASA C. CHANDLER, M.Sc., Ph.D., Professor of Biology, Rice Institute, Houston, Texas. Ryl. 8vo, pp. xii 291, v plates, fig. 65 London: Baillière, Tindall & Cox. Price 22s. 6d. net.

IN their preface the authors draw attention to the scattered nature of the literature dealing with Anthelmintics, and they express the opinion that few medical or veterinary practitioners, or even research workers on the anthelmintic infection are likely to have access to all, or even to the greater part of the various publications relating to this branch of therapeutics. Their object in publishing this treatise is to fill this need. The authors have expressed their own views and have at the same time presented those of various other observers in an impartial manner.

Readers in touch with modern literature will not expect to learn much with which they are not familiar, but they will experience the advantage of having the present-day knowledge welded between two covers, and they will, moreover, find an extensive bibliography at their disposal. The less experienced will experience a little difficulty in estimating the value of the various treatments of like conditions and may prefer to follow the writings of those who advocate a very different line of treatment.

The medical and veterinary aspects are conjoined—a distinct gain in that it gives one a broader aspect of the advantages and disadvantages of the actions of any particular drug. From a veterinary aspect the publication would have been greatly improved had the knowledge of a veterinary surgeon, experienced in anthelmintic affections, been available.

The publishers have turned out the book in their customary good style, and, in condensing the present-day knowledge of this extensive subject, the authors are to be congratulated.—A.R.S.

News

National Veterinary Medical Association.

The Newcastle-Upon-Tyne Congress.

SEPTEMBER 1ST TO 7TH, 1928.

Programme.

SATURDAY, SEPTEMBER 1ST.

10 *a.m.* : Council Meeting.

3.30 *p.m.* : Inaugural Meeting, in King's Hall, Armstrong College, with adjournment for tea at 4.45 p.m. (Members are requested to wear Academic Dress.) To be followed by the Forty-Sixth Annual General Meeting.

8.30 *p.m.* : Dance in King's Hall, with Card Room available for non-dancers.

SUNDAY, SEPTEMBER 2ND.

11 *a.m.* : Church Service at St. Nicholas Cathedral. (Academic Dress optional.)

N.B.—Robing facilities will be provided in the Town Hall on the Sunday morning for members, and ladies should join them at the Town Hall to take part in the short procession to St. Nicholas Cathedral.

MONDAY, SEPTEMBER 3RD.

9.30 *a.m.* : Formal Opening of the Trade Exhibition by the President.
10 *a.m.* : Paper : " The Veterinarian in Public Health."
2 *p.m.* : Visit to Mr. Sanderson's Ayrshire herd, and Garden Party at Eshott Hall.
8.30 *p.m.* : President's Reception and Dance, in the King's Hall.

TUESDAY, SEPTEMBER 4TH.

10 *a.m.* : Paper · " Lamb Dysentery."
12 *noon* : Lantern Talk on the Roman Wall, by Dr. O. Charnock Bradley.
2 *p.m.* : Paper : " The Horse as a National Economic Factor."
8 *p.m.* : Civic Reception in the Laing Art Gallery.

N.B.—In order that formal invitations may be issued for the Civic Reception it is most important that members proposing to attend should notify the Local Secretary WITHOUT DELAY, *giving the names of ladies and gentlemen composing their parties.—J. R. Rider, M.R.C.V.S., Ivycroft, Carmel Road, Darlington.*

WEDNESDAY, SEPTEMBER 5TH.

9.30 *a.m.* : Whole day excursion to the Roman Wall, if sufficient numbers apply for tickets.
10 *a.m.* : Paper : " Disease Resistance."
2 *p.m.* : Operation and Demonstrations in Royal Artillery Drill Hall, Barrack Road.

Surgical Programme.

(In the Drill Hall.)

Castration of a Cryptorchid by the Flank Method, by Mr. J. B. Mackie, assisted by Dr. Mackie.

Castration of a Cryptorchid by the Inguinal Method, by Mr. W. Brown.

Ovariotomy in the Heifer, by Mr. R. Hudson.

Ovariotomy in Young Sows, by Mr. F. L. Gooch.

Ovaro-Hysterectomy in the Bitch, by Major F. Chambers.

Demonstrations.

(In the Drill Hall.)

Caponising of Cockerels, by Mr. F. J. L. Croudace.

Tuberculin Tests in Poultry, by Mr. W. Lyle Stewart.

Post-mortem Detection of small Trichostrongyles in the Stomach of Sheep, by Mr. W. Lyle Stewart.

Surgical Programme, by Mr. O. Stinson.

(In the Riding School.)

Normal Castration of Colt, under Chloroform Anæsthesia, administered in the standing position.

Crucial Incision Operation for the Relief of the Sphincter of the Cow's Teat.

Mr. Stinson will begin the operation on the colt at approximately 3 *p.m.*, and the operations and demonstrations in the Drill Hall will begin simultaneously at 2 *p.m.*

7.30 *p.m.* : Annual Banquet, in the Grand Assembly Rooms, Barras Bridge.

THURSDAY, SEPTEMBER 6TH.

10 *a.m.* : Paper : " The Adulteration of Foods and its Effects on Animals."
2 *p.m.* : Paper : " Veterinary Education—Reconstruction."
2 *p.m.* : Excursion to Durham, including drive through Lambton Park.
7.30 *p.m.* : Popular Lecture in King's Hall : " Milk," by Lieut.-Col. J. W. Brittlebank, Manchester.

FRIDAY, SEPTEMBER 7TH.

9.30 *a.m.* : Closing Meeting.
10 *a.m.* : Council Meeting.
10.30 *a.m.* : Excursion to Alnwick and Bamburgh.

Social Programme.

SATURDAY, SEPTEMBER 1ST.

3.30 *p.m.* : Inaugural Meeting, with Civic Welcome, followed by Academic Welcome. (Members are requested to wear Academic Dress.)
8.30 *p.m.* : Dance in King's Hall, with Card Room available for non-dancers.

SUNDAY, SEPTEMBER 2ND.

11 *a.m.* : Church Service at St. Nicholas Cathedral. (Academic Dress optional.) Members will robe in the Town Hall, where ladies should join members to take part in the short procession to the Cathedral.

MONDAY, SEPTEMBER 3RD.

2 *p.m.* : Visit to Mr. Sanderson's Ayrshire herd and Garden Party at Eshott Hall.
8.30 *p.m.* : Reception and Dance, by the President, in the King's Hall, Armstrong College.

TUESDAY, SEPTEMBER 4TH.

12 *noon* : Lantern Talk on the Roman Wall, by Dr. O. Charnock Bradley.
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7.30 *p.m.* : Annual Banquet, in the Grand Assembly Rooms, Barras Bridge.

THURSDAY, SEPTEMBER 6TH.

12 *noon* : Congress Photograph, Outside Main Entrance, Armstrong College.
2 *p.m.* : Excursion to Durham, including drive through Lambton Park.
7.30 *p.m.* : Popular Lecture in King's Hall, Armstrong College, by Lieut.-Colonel J. W. Brittlebank, C.M.G., M.R.C.V.S., D.V.S.M. (Vict.). Subject : " Milk."

FRIDAY, SEPTEMBER 7TH.

9.30 *a.m.* : Closing Meeting in King's Hall.

10.30 *a.m.* : Whole day excursion to Alnwick and Bamburgh, returning by Embleton and Warkworth.

Badge and Souvenir Guide Book of Newcastle-upon-Tyne at an inclusive price of 2s. 6d. or separately at 1s. 6d. each obtainable from the Local Secretary's Office during the Congress.

Tennis at Cochrane Park. Golf and Bowls will be available during the week.

Ladies will be specially welcomed to the Social functions, and it is hoped that as many as possible will enter for the Tennis Tournament.

Entries, accompanied by the Entrance Fee of 2s., should be sent to Mr. J. H. Taylor, F.R.C.V.S., 105, Stanhope Road, Darlington. Tennis balls will be provided. Times will be published on the Congress notice board at Armstrong College.

Appointments

Lt.-Col. Sir Merrik R. Burrell, Bart., C.B.E., Floodgates, West Grinstead, Horsham, has been appointed Chairman of the General Purposes Committee of the Royal Veterinary College, in succession to the late Mr. Edgar M. Crookshank, and Mr. Ernest Mathews, C.V.O., who has resigned from the office of Honorary Treasurer of the College is succeeded by Lt.-Col. Sir Archibald Weigall, K.C.M.G., 39, Hill Street, Berkeley Square, London, W.1.

The following Colonial Veterinary Appointments have been made by the Secretary of State for the Colonies during the month of July, 1928 :—

Mr. H. A. Hay-Berkeley, M.R.C.V.S., to Kenya Colony ; and Mr. J. F. Timoney, M.R.C.V.S., to Straits Settlements.

Publishers' Notices

All communications should be addressed to 7 & 8, Henrietta Street, Covent Garden, London, W.C.2. Telephone: Gerrard 4646. Telegrams: "Bailliere, Rand, London."

Letters for the JOURNAL, literary contributions, reports, notices, books for review, exchanges, new instruments or materials, and all matter for publication (except advertisements) should be addressed to the Editor.

Copy of advertisements should be in the hands of the publishers—Bailliere, Tindall and Cox—not later than the 25th of the month, or if proof is required, not later than 23rd.

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